The Application Control Environment, or ACE node, is an Experion controller running on a server-grade PC ideally suited for supervisory control solutions and integration with third-party control systems. Experion® PKS – The Knowledge to Make it Possible.

The ACE node provides all the functionalities of the Experion controller running on a PC platform. Experion ACE software is based on Honeywell’s Control Execution Environment (CEE), the same control environment that is used in the C300 and C200E controllers. The CEE combines robustness and flexibility in a unified environment. The ACE CEE provides users with an application environment where applications execute in a deterministic, consistent and reliable mode.

Continuous Evolution
The ACE is an example of Honeywell’s promise of continuous evolution. It can be easily connected to a TPS or TDC 3000 system with a dedicated LCN connection and exchange control data through a direct connection with TPN resident controllers, including the 30-year-old Basic Controllers, which are still in service today. The TPN control cascade functionality is supported through a set of specialized function block libraries.

Consistent Engineering Tools
The ACE CEE is configured using Control Builder, the same tool that configures all Experion controllers. This environment offers dedicated function blocks to meet all standard control requirements for continuous processes, batch processes, discrete operations and machine control applications. In addition, the ACE offers the user the ability to create function blocks, such as Honeywell Custom Algorithm Blocks (CAB), Custom Data Blocks (CDB) and Peer Control Data Interface (PCDI) blocks.

To complement the ACE offering, the system also supports an ACE Simulation Environment (SIM-ACE). Together with the SIM-C300 and SIM-C200E and an Experion Server, Honeywell offers a complete system simulation capability without requiring dedicated controller hardware or process connections, providing a powerful capability for basic control strategy checkout as well as high fidelity operator training and simulation (OTS) systems.

Since the ACE CEE is optimized for execution on a server-grade PC platform running the Microsoft Server operating system, it can benefit from the expandability and upgrade possibilities of current PC platforms.

Dedicated Platform for Various Control Applications
The ACE provides a control platform that can be utilized for a wide variety of applications that do not require an embedded controller. For example, it can be used for supervisory control applications, procedural operations using standard function blocks and custom applications using CAB.

The wide range of standard ACE controller features includes:

- 500 msec base control execution environment with multiple selectable execution periods including background processing for CAB function blocks
- Shared standard function blocks with the C200E and C300 controllers
- Custom Data Blocks
- Connectivity to the supervisory network through Honeywell’s robust Fault Tolerant Ethernet (FTE)
- Custom Algorithm Block runtime functionality
- Support for data transfer with other Experion PKS clusters

Optional features include:

- Connectivity to LCN through an onboard LCNP4 card
- Powerful supervisory control functions on top of other control platforms such as TDC 2000®, TDC 3000®, TPS and non-Honeywell DCS controllers
Experion Application Control Environment (ACE)

- Integration of OPC data access directly into the control environment
- Custom Algorithm Block developer tool

The ACE CEE supports a large number of function blocks covering continuous, sequential and discrete applications, all identical to the function blocks used in the C200 and C300 controllers. The advantage is that applications can be easily adapted for different platforms. This allows the user to make optimal use of control resources without significant engineering or implementation effort.

In addition to the standard function blocks, the ACE supports function blocks for supervisory control over other control systems such as the Process Manager or the Basic Controller.

It also supports an efficient data transfer mechanism for array type parameters. Instead of transferring single array elements, one can now transfer an entire array with a single connection, which makes it possible to efficiently exchange data between different applications and reduce engineering effort. The ACE CEE statistics provide the control engineer with detailed information concerning number of array elements processed per second and the number of elements requested per second.

The ACE CEE supports an extended set of execution periods specifically to accommodate slow execution, which is often required with supervisory control or validation applications. The CEE supports execution periods ranging from 500 msec to 24 hours for individual control modules (CMs) and 500 msec to 20 seconds for individual sequential control modules (SCMs). The execution is deterministic, which guarantees timely execution. With slower execution, the data refresh rate becomes important; therefore, the ACE supports a 'pre-fetch' feature. This feature guarantees the availability of new data just before the execution of a slower executing control module.

Some function blocks, such as the regulatory control and data acquisition blocks, support insertion points to provide added flexibility and customization. Insertion point capability enables users to use CAB blocks to add specific custom algorithms to the normal block execution. For example, a user could add a PV characterization beyond the standard provided linear or square root characterization.

**Experion Custom Algorithm Block**
A CAB is similar in purpose and structure to the standard function blocks that are distributed with Experion controllers. Examples of standard function block types include regulatory control blocks, such as PID and RAMPSOAK. Standard block types can be instantiated and used in control modules. These blocks have a predefined algorithm and a predefined data structure. By contrast, CABs have user-defined algorithms and data structures.

Once a CAB block type has been created, it behaves and acts like any standard function block. It resides in a Control Builder library and can be used in a control module through drag-and-drop functionality. Its user-defined parameters, alarms and algorithms can be accessed by the Experion server, stations, ACE, C200E and C300 controllers. In addition, a CAB block type can be exported from and imported into other Experion systems, just like control modules, and used with the ACE CEE or, new in Experion PKS R400, the C300 CEE.

A CAB Developer license is required to create and edit CAB block types. The CAB algorithm is programmed in Visual Basic through the standard Visual Studio application which is fully integrated with the Control Builder engineering tool.

**Inter-Cluster Communication**
Inter-cluster communication allows the user to exchange control data between ACE nodes that reside under different Experion servers. This occurs when an Experion system consists of multiple Experion clusters. Full control cascade and initialization is supported through standard function blocks.

**Local LCN Connectivity**
Another powerful feature of the ACE node is the support for a direct connection to the LCN through an onboard LCNP4 card. The ACE-T provides an additional AM node on the LCN. AM points and CL can be built on this node.

This local LCN connection allows CEE-based control strategies to directly interact with LCN resident controllers. This means a single CEE-based control strategy can make a fully-functional direct cascade connection, including initialization and anti-windup, to a mixture of C200, C300 and LCN-based controllers.

Together, these features provide a minimal risk and engineering migration path from AM to ACE. Existing AM and new CEE control strategies can be built, tested and run side-by-side in the AM and CEE environments.

**Easy Controller OPC Data Integration**
The ACE node easily integrates OPC data. The OPC Gateway block is a dedicated OPC interface to an OPC Data Access server.

After configuration of the OPC Gateway, the engineer can make named parameter references from control strategies to the points and parameters available in the connected OPC server.
Benefits
Honeywell’s solution brings together third party connectivity and custom programming into one package. Common benefits include:

- Common CEE with other controllers minimizes learning curve
- Connectivity to third-party systems opens up a wide range of control possibilities as a supervisory node
- Custom algorithm blocks allow development of user-defined programs that execute within the CEE
- Optional TPS integration (ACE-T) extends the lifecycle of installed TDC components and facilitates cost-effective introduction of powerful Experion capabilities such as Procedural Operations

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