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Communication Aspects of IEC 61499 Architecture

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54.1 Introduction

The IEC 61499 standard [1] defines a system architecture for industrial measurement and control systems based on the concept of *function block*. A function block (FB) is a software unit (or, more generally, an *intellectual property* capsule) that encapsulates some behavior and facilitates its re-use.

The International Electrotechnical Commission (IEC) initiated the IEC 61499 project to address the AQ1 limitations of the legacy PLC programming languages looking toward the realities of implementing AQ2 real-time multiagent systems. Unlike previous standardization efforts, this is not a retrospective recognition of practices, but an attempt to guide future developments toward an open standard that allows genuine vendor interoperability.

FBs provide a pathway to integrate established automation programming languages, such as ladder logic, instruction list, or structured text, into modern component architecture. However, their application extends past simple replacement of legacy systems because of the inherent support for distributed applications and ability to provide a platform for modeling and simulating with well-defined interfaces. IEC 61499 defines three classes of FBs—basic FBs, composite FBs, and service interface FBs—for capturing and hiding platform-dependent functions of devices. Each FB has a set of input and output variables. The input variables are read by the internal algorithm when it is executed, while the results from the algorithm are written to the outputs.