IMA: The Good, The Bad, and The Ugly

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Abstract

Integrated Modular Avionics (IMA) is an architectural approach for improving the development and reducing the cost of avionics systems. The principles of this approach are based on a modular architecture with a standardized set of components and interfaces for the hardware and software in aircraft. This leads to a distributed networked computing platform as a shared resource for the embedded application software ranging from safety-critical avionics components such as flight control to passenger services such as flight status information and network connectivity.

In this presentation we will discuss the good, the bad, and the ugly of a key concept of IMA, the partition concept. A partition provides special and temporal isolation. Acting as a virtual machine it allows different application subsystems to be collocated on the same processor while ensuring that they do not affect each other. Moving legacy applications that previous ran on dedicated processors onto a partitioned architecture can, however, have unexpected side effects. Previously stable control algorithm may become unstable, and previously met response time requirements may not be satisfied. Not only that, but if not used appropriately one partition may affect the performance of another as well as the performance of the underlying processor.