# CASE STUDIES OF MAPUSOFT SOLUTIONS

# Defense and Mil-Aero Industry Segment

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CASE STUDY

**1**

The Boeing Company, California, USA

## BACKGROUND

Boeing's defense division developed an advanced platform architecture called System of Systems Common Operating Environment (SoSCOE) for the US military under the Future Combat System (FCS) program (aka BCT Modernization program). SoSCOE enabled enhanced joint connectivity and situational awareness while supporting multiple operating systems and hardware target platforms. SoSCOE was hosted upon MapuSoft's Cross-OS platform solution which provided interoperability between VxWorks®, Linux, and LynxOS while freeing applications from their underlying operating systems to allow future portability

## PROJECT

• FCS program is a very large program for which the software assets needed to be reusable and not tied to a specific vendor's solution.

• US military required that applications developed on SoSCOE be based on strict POSIX standards; however the commercial real-time operating systems needed to run SoSCOE did not support the required POSIX standards.

• SoSCOE requires kernel resources with guaranteed availability during run-time.

## PRODUCT

**Cross-⦰S**®
Development Platform

## SOLUTION

MapuSoft's Cross-OS Development Platform (previously called OS Abstractor) was chosen because of its POSIX standards compliance and OS Abstractor's advanced real-time memory and thread management features. Boeing's SoSCOE was integrated with the Cross-OS Development Platform in order to allow SoSCOE to support multiple Target OS environments. The POSIX component offers industry standard API compliance for new code development and/or re-use of existing POSIX code base across multiple OS platforms while adhering to the standards set by the US military for the POSIX requirements. MapuSoft's Cross-OS Development Platform protects software investment by eliminating the risks associated with OS selection and/or use of proprietary API features. It allows developers to use a standard API interface across multiple OS platforms and greatly reduces the costs associated with code maintenance and learning multiple operating systems.

# CASE STUDY

## 1

### The Boeing Company, California, USA

"MapuSoft's Cross-OS Development Platform provides many OS back ends which will be a great benefit to SoSCOE, which runs in a variety of environments", said Al Williams, SoSCOE's Chief Architect.

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# CASE STUDY

## 2

L-3 Communications, Alpharetta GA, USA

## BACKGROUND

L-3 Communications (L-3) is an aerospace and national security solutions contractor. L-3 is also a leading provider of a broad range of communication and electronic systems and products used on military and commercial platforms. L-3 supplies critical aircraft and system integration design and support services to aircraft primes, integrators and military services/users such as NASA, Lockheed Martin and Raytheon, etc.

## PROJECT

L-3 wanted to integrate and re-use their state-of-art display software written in Ada code into Lockheed Martin's C-130J Super Hercules aircraft system developed using C/C++ language running VxWorks.

## PRODUCT

## Ada-C/C++
### CHANGER®

## SOLUTION

MapuSoft's Ada-C/C++ Changer tool provided 100% code conversion of Ada code to C/C++ which eliminated the need for an expensive, risky and time consuming manual code re-write. In addition, the OS Abstractor component integrated with Ada-C/C++ Changer provided the real-time scheduling services for the converted code and allowed them to seamlessly integrate with the rest of the C/C++ code and run on the VxWorks platform.

The MapuSoft solution provided L-3 with the flexibility to adapt the existing Ada solution to the customer's C/C++ requirement with a re-write of the original Ada code thereby reducing the total project cost and time.

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Northrop Grumman Technical Services, Oklahoma City, USA

## BACKGROUND

Northrop Grumman (Northrop) is a leading global security company providing innovative systems, product and solutions in unmanned systems, cyber, C4ISR and logistics and modernization to government and commercial customer worldwide.

## PROJECT

Northrop's Data Acquisitions & Performance Advisories systems consist of several functions like Takeoff and Landing Data (TOLD), Center of Gravity Weight and Balance, Data Acquisition functions, Fuel Target Selection, ARINC 739 communication, Voice Alerter functions, LN-120 Data Loader function, Flight Data Recorder output function and Maintenance function. Northrop wanted to move the system to a new target platform running on LynxOS-178 operating system. Unfortunately, the target system does not support the Ada tools.

## PRODUCT

**Ada-C/C++**
CHANGER®

## SOLUTION

Northrop decided to use MapuSoft's Ada-C/C++ changer to convert their Ada code to C/C++ and then use a C/C++ tool chain to build the application for the new target hardware. In addition, the OS Abstractor component integrated with Ada-C/C++ Changer provided the real-time scheduling services for the converted code and allowed them to seamlessly run on the ARINC 653 certified LynxOS-178 platform.

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# MAPUS⊘FT

Northrop Grumman Corporation, Baltimore MD, USA

## BACKGROUND

Northrop Grumman (Northrop) is a leading global security company providing innovative systems, product and solutions in unmanned systems, cyber, C4ISR and logistics and modernization to government and commercial customer worldwide.

## PROJECT

Northrop's Next Generation Vehicle and Dismount Exploitation Radar system (NGV VADER,) an airborne tactical radar system was running on the VxWorks operating system and Northrop wanted the system to run on Linux.

## PRODUCT

⊘S CHANGER®

## SOLUTION

Using MapuSoft's VxWorks Porting Kit, Northrop easily and quickly moved their legacy system from VxWorks to Linux. MapuSoft also provided real-time functionalities to the Linux platform.

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## CASE STUDY

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Northrop Grumman Corporation, Baltimore MD, USA

## BACKGROUND

Northrop Grumman (Northrop) is a leading global security company providing innovative systems, product and solutions in unmanned systems, cyber, C4ISR and logistics and modernization to government and commercial customer worldwide. Northrop is a principal member of the Lockheed Martin-led industry team that is heading F-35 program. Northrop plays a critical role in the development, demonstration and production of this multi-role fighter.

## PROJECT

Northrop wants to develop a new prototype software taken from the current F-35 program which is jointly run with Lockheed Martin. The system runs on the VxWorks operating system and Northrop wants the new prototype to run on a Linux platform.

## PRODUCT



## SOLUTION

Northrop decided to use MapuSoft's migration tools for their internal testing and development of their new prototype model. Once developed and tested, these prototypes will be demonstrated for their aerospace and defense customers and upon a successful demonstration and acceptance, the prototype products will be put into production.

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## CASE STUDY

### 6

Lockheed Martin Corporation, Orlando, Florida

## BACKGROUND

Lockheed Martin (Lockheed) is an American global aerospace, defense, security and advanced technology company with worldwide interests. It was formed by the merger of Lockheed Corporation with Martin Marietta in March 1995. It is principally engaged in the research, design, development, manufacture, integration and sustainment of advanced technology systems, products and services.

## PROJECT

As part of the C143 Program, Lockheed introduced embedded training on the USS Arleigh Burke (DDG-51), the lead ship of the Arleigh Burke-class guided missile destroyers. Part of this task is to simulate existing propulsion software on their instructors WindowsXP workstations. So their application needed to be ported to run on the Windows XP platform.

## PRODUCT

⊘SCHANGER®

## SOLUTION

MapuSoft's VxWorks OS Changer Porting Kit allowed Lockheed to quickly port their LM STS application to the Windows XP operating system while adding real-time features to Windows XP.

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# CASE STUDY

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Raytheon Company, Tewksbury MA, USA

## BACKGROUND

Raytheon works on different product development segment like Missile Defense, Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance, Electronics Warfare and Precision Weapons. The Raytheon Company is a major American defense contractor and industrial corporation with core manufacturing concentrations in weapons, military and commercial electronics. Raytheon is the world's largest producer of guided missiles.

## PROJECT

Raytheon was looking for a simulation platform where their developers would be able to develop and test VxWorks applications on Windows host machines before their target hardware would become available. The VxSim option provided by Wind River was expensive and didn't integrate with the MFC based test code.

## PRODUCT



## SOLUTION

MapuSoft's VxWorks OS Changer Porting Kit contains VxWorks interface APIs which allowed Raytheon to develop VxWorks applications on Windows Host machines. They can now Build, Run, Debug and Test VxWorks applications natively without tools from Wind River. This allowed them considerable savings during software development.

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