

# LynxOS-178 RSC

The first and only COTS operating system to receive acceptance for reusability from the FAA



## What is an RSC?

A Reusable Software Component (RSC) is a software collection that is recognized as meeting the requirements of RTCA/DO-178B and that may be used on more than one project without having to regenerate certification artifacts.

## How does it work?

The FAA grants RSC acceptance as part of a normal certification process, provided that the applicant complies with the guidance policy defined in FAA Advisory Circular AC 20-148. The acceptance allows future users of the RSC to deploy the software without the added cost and risk of recertification. This applies to components such as operating systems and networking protocols, that can then be reused (in unadulterated form) across hardware platforms.

## Why is it important?

All software developers reuse what they create. But compliance with DO-178B makes reuse difficult because it often requires expensive recertification efforts. Until now, there was no standard approach to reuse of safety-critical software.

## Is it just a set of artifacts?

The LynxOS®-178 RSC is more than just a set of DO-178B artifacts. In fact the RSC follows the guidance of AC 20-148 by addressing the

most difficult and critical areas of certification: integration with multiple applications at various levels of DO-178B criticality.

The documentation set includes a detailed partitioning and interface analysis that focuses on time, space and resource partitioning as well as timing margin analysis so developers can allocate budgets to use of operating system services. The set of RSC guidance documentation includes requirements, design data, test suites and coverage analysis to meet DO-178B requirements.

## LynxOS-178 RSC

The LynxOS-178 RTOS is the first and only time- and space-partitioned, FAA-accepted RSC.

LynxOS-178 offers the interoperability benefits of POSIX® along with support for the ARINC 653 Application EXecutive (APEX).

The LynxOS-178 RSC is designed to be hardware-agnostic, so no changes are required to move the RSC onto other hardware platforms. The LynxOS-178 RSC acceptance applies to a family of PowerPC® processors, including the PPC 75x, 74xx, 4xx, 603 and IBM 970.

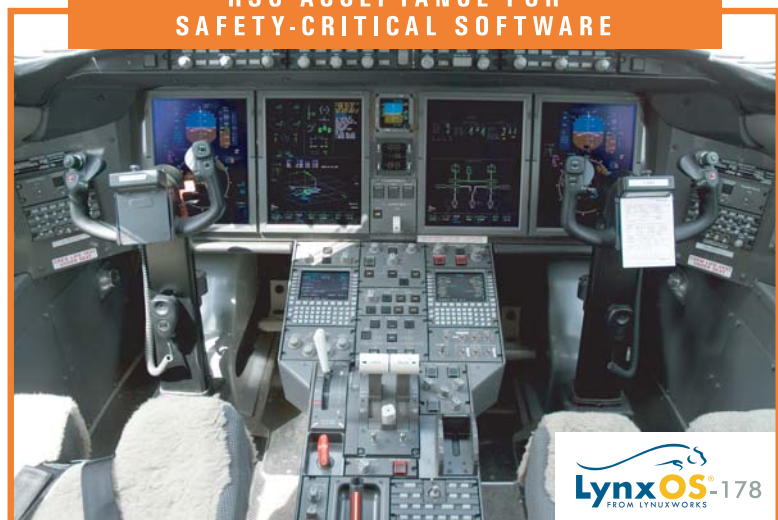
## Economic benefits of the RSC

The economic value of an RSC lies in its ability to do three things:

- Reduce engineering labor
- Reduce program risk
- Reduce cost

## THE FIRST. THE ONLY.

RSC ACCEPTANCE FOR  
SAFETY-CRITICAL SOFTWARE



When an RSC is properly verified using the foresight of future use, then it is possible to perform verification to most DO-178B objectives and not have to revisit these activities if the RSC is not modified in future projects.

The LynxOS-178 RSC provides integrators with guidance on how to integrate the RSC into applications and retain certification credit for the RSC.

More importantly, the LynxOS-178 RSC artifacts provide "educational value" to the integrator that reduces engineering labor. This educational value is provided in the form of written guidance and tests that help the integrator assimilate their applications on top of the LynxOS-178 RSC in a timely manner.

This educational value of the LynxOS-178 RSC artifacts provides integrators with a savings of 3-6 months of engineering labor over conventional DO-178B artifacts. This learning economy can be consistently applied in future projects.

The LynxOS-178 RSC also reduces program risk by focusing certification audits where they should be focused: on the DO-178B objectives that remain to be satisfied and the integration of the component into an application.

With a standard set of DO-178B artifacts, a certification auditor can examine any part of the artifacts, even those areas that have been examined by someone else. On many occasions, developers who envision low risk with submittal of standard DO-178B artifacts have

found themselves the subject of auditors' qualitative interpretations that result in added explanations, action items and even additional verification work resulting in a prolonged project schedule. An auditor's job is to scrutinize results closely and aggressively find weaknesses in the verification process. Very often it's impossible to get through an audit the first time, even if the software has been approved before.

The RSC concept avoids this dilemma by focusing the engineering and auditing effort on software integration, not previously verified operating system functions such as message queues.

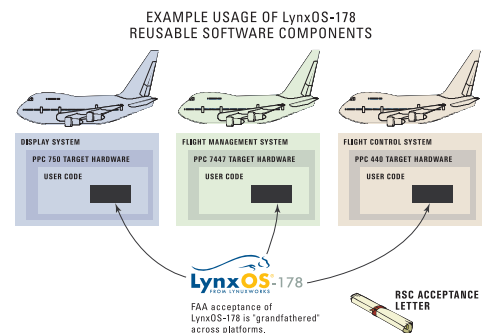
LynuxWorks' LynxOS-178 RSC acceptance can provide integrators with a savings of 6-9 months of schedule risk over conventional DO-178B artifacts. This risk economy can be consistently applied in future projects.

Lastly, the value of the LynxOS-178 RSC is to reduce overall cost to our customers. LynuxWorks' LynxOS-178 operating system comprises approximately 60,000 lines of code.

The effort to verify a time- and space-partitioned operating system of this size is tens of person-years of effort. The concept is simple; an accepted RSC that meets DO-178B objectives saves the integrator the cost of verification of an operating system.



- **Low risk**—FAA-accepted RSC time/space-partitioned RTOS for multiple applications up to Level A
- **Reduced costs**—eliminates man-years of effort and significantly lowers overall cost of certification
- **High value**—most robust feature set of any DO-178B certifiable OS enables rapid time-to-market
- **POSIX conformance**—the only DO-178B-certifiable RTOS available today for safety-critical systems with POSIX conformance
- **Support for ARINC 653**—ensures application portability, software reuse and interoperability between embedded systems



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