White Paper

SGI Support and Value Add to the Common Operating Environment

Providing Compliant Systems for Defense Customers

1.0 Common Operating Environment (COE) Background

The COE was initiated to establish a commonality of major system functions—mapping, track management, and communication interfaces, among others—within a federated command-and-control system. Ongoing COE developments focus on resiliency, security, and interoperability among heterogeneous environments. In the future the COE will be modified to support sensor-to-shooter real-time applications. All new Defense Information Systems Agency (DISA) systems are being built using the COE standards, and existing DISA systems are being migrated to use the COE as well.

SGI® high-performance computing and visual technologies are available to support the Command, Control, Communications, Computer, Intelligence, Surveillance, and Reconnaissance (C4ISR) warfighter's core mission. One example of such technology is the SGI decision support center solution, which provides a new level of visual collaboration to joint force commanders. SGI provides unrivaled performance in solution platforms that support complex and advanced data management.

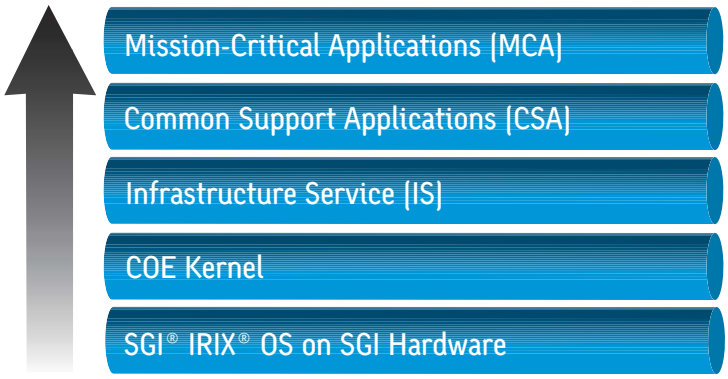
As warfighters generate increasingly demanding C4ISR and weapons control requirements, SGI is committed to provide COE-compliant solutions that maintain SGI's leadership in high-performance computing, secure real-time architectures, graphics processing, and immersive display technology.

2.0 COE Principles

COE emphasizes software and data reuse, as well as interoperability for data and software. But its principles are more far-reaching and innovative. The common operating environment concept encompasses all of the following:

- An architecture of interoperable systems (plug and play)
- Common human/machine interface
- Reusable software components and data
- Strict system security requirements

The goal of the COE standard is to establish common system functions that can be extracted and implemented as a set of extensible low-level building blocks and made readily available to system designers and system integrators. Interoperability can be significantly improved because common software can be used across systems for common functions. Development schedules can be accelerated and substantial savings achieved through software reuse that is guided by COE standards. COE functionality is provided by software layers built from the bottom up.



3.0 COE Architecture on SGI IRIX

The IRIX operating system running on SGI hardware provides a robust and feature-rich environment that fully supports the layers above it. High-performance computing and 3D graphics capabilities built into the SGI IRIX architecture with MIPS® processors are sound build-

ing blocks to support the demanding requirements of mission-critical applications. In addition to the commercial compliance with POSIX standards required by the COE program, IRIX provides other capabilities, such as:

- Real-time performance with IRIX running REACT™ software
- High-availability features with the FailSafe™ family of system software
- Security features evaluated by the National Security Agency
- Data integrity assurances by XFS™ filesystems
- SGI® NUMA, the most flexible and scalable hardware architecture in the industry, providing scalable computer systems and the highest I/O throughput
- Binary compatibility, from desktop systems to large high-performance computing platforms such as the SGI® Origin® server family

4.0 The COE Kernel

The COE kernel is the minimal set of software required on every platform, regardless of how the platform will be used. A COE kernel contains the operating system and windowing environment and will normally include several other features such as a basic system administration function, a basic security administration function, an executive manager function, a utility for creating privileged operator login accounts, a utility for creating nonprivileged operator login accounts, and COE tools for segment installation. Also, the COE Developer's Toolkit provides an environment for system integrators and developers who develop mission applications under the COE. The COE kernel running on SGI IRIX is COE compliant.

Compliance with the COE has been mandated for C4ISR systems by the JTA specification. COE compliance certification is accomplished through the COE Kernel Platform Certification (KPC) program. This program validates standards conformance through the Integration and Run-Time Specification Certification Criteria. The COE platform must comply with testing that includes in-depth functionality checking and security lockdowns that greatly increase systems' security integrity. SGI is one of only two vendors to complete such rigorous testing.

5.0 COE Compliance Across the IRIX and MIPS Product Lines

The COE KPC process is extensive and thorough. It puts into practice all COE principles when it certifies a specific vendor platform. However, time and cost do not permit COE certification for all combinations of CPUs, operating systems, and computers.

SGI's policy on IRIX running MIPS processors mandates application binary compatibility across all release levels of its IRIX 6.5 operating system throughout its product family. This policy has been successfully implemented for the last four years and assures the warfighter that the COE kernel will execute correctly across all SGI computers running the IRIX 6.5 operating system. The COE kernel has been tested internally in a number of hardware variants without requiring recompilations, from IRIX® 6.5.3 to the latest release of IRIX.

In addition, SGI continues to invest in the IEEE/POSIX and UNIX® Open Group branding. This branding effort, combined with SGI's application binary compatibility guarantee, demonstrates SGI's commitment to the COE program.

6.0 Above and Beyond Kernel Compliance: IS, CSA, and ICSF

SGI has already invested in the KPC program and accomplished a successful certification with COE kernel version 3.3. But that success is just the beginning. SGI has ported the newest release of the kernel (V. 4.2), and will continue to port all new releases and upgrades. SGI personnel are trained to support COE kernel problem resolutions in the latest versions ported to IRIX and will provide patches if necessary.

SGI activities in support of the COE do not stop with the COE kernel. SGI has created a COE build list, which includes key COE infrastructure services and common support applications (CSA). These software elements support the development and deployment of many important mission-critical applications. This new and aggressive effort includes porting of the Integrated C4ISR System Framework (ICSF). ICSF has been recognized as the most important element of the CSA, used widely across defense operators.

7.0 Expanded COE Participation

SGI intends to stay active within the COE community, including support of the COE management and the technical working groups as well as various special interest groups. Please visit SGI's Web site at www.sgi.com for more information on SGI products, software, and solutions as they relate to COE.

8.0 SGI Commitments to COE

SGI demonstrates its commitment to COE by:

- Continuing its leadership in high-performance computing, secure real-time architectures, graphics processing, and immersive display technology to ensure that warfighters can satisfy their most challenging operational C2 and weapons control requirements on COE-compliant platforms
- Ensuring all IRIX architectures are compliant with COE version 4.2
- Working with DISA COE to establish and improve a certification process that ensures current versions of both COE kernel and vendor architectures are available and compliant
- Bringing the most advanced broadband and graphically capable IRIX architectures to the deployed warfighter
- Offering complete COE architecture support with an SGI build list that includes applications such as the Integrated C4ISR System Framework
- Being a leader in the COE community

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3174 (05/02) JI3203