



By Curt Schwaderer

CompactPCI & AdvancedTCA

Service Availability Forum continues to drive carrier grade building block standards

Communications technologies have and will continue to further evolve into multiservice networks. Three main driving technologies: landline, Internet, and mobile communications, are converging into a fully interoperable, multiservice network, providing voice, video, and other multimedia services from handset to television screen.

Further, countless millions (likely even billions) of dollars are spent annually writing proprietary software for custom-built carrier grade equipment. Management solutions have difficulty integrating with and managing these custom-built systems. The communications industry has reached a point where it is absolutely critical for systems to be highly reliable and much more cost effective.

Historically, communications systems were built from completely custom pieces by both network equipment and service providers. Custom, high reliability components are very costly to develop and maintain however. Therefore, standards such as CompactPCI and AdvancedTCA form a hardware platform foundation for high reliability convergence communications systems. However, challenges, including interoperability of applications and management of these systems, still exist. The Service Availability Forum (SA Forum) focuses on these challenges.

Standard building block form factors such as CompactPCI and AdvancedTCA are critical in the move to Commercial Off-the-Shelf (COTS) high reliability systems. The SA Forum and the hardware interface as well as the software Application Programming Interface (API) standards they create are an equally critical part of the evolution towards high reliability, commercial building block, convergence communications systems.

In this column, we will take a look at the SA Forum, its members, and what they are working on, and offer an overview of SA Forum specifications available for download.

SA Forum charter

The SA Forum website states, "The Service Availability Forum specifications enable the implementation of carrier grade systems and services built with COTS building blocks, for the benefit of telecom service providers/operators, network equipment providers, and independent software vendors."

The focus is on software APIs revolving around application, management, and hardware platform interoperability. The assumption here is that if developers write the APIs relating to hardware interface, management, and applications robustly and completely with rigorous conformance and testing criteria, platforms meeting SA Forum standards will inherently provide the reliability carrier grade, high reliability networks demand.

The service availability solution not only encompasses High Availability (HA) requirements of 99.999 percent availability, but also strict service continuity requirements. That is, there shall be no loss of service during fault management actions.

Primary/backup redundancy also figures into the service availability specifications. The platform and management programming interfaces incorporate the concept of primary/backup redundancy. APIs abstract redundancy to allow application operation during failover.

SA Forum specifications overview

Figure 1 shows the SA Forum reference architecture and places the service availability interfaces within the architecture.

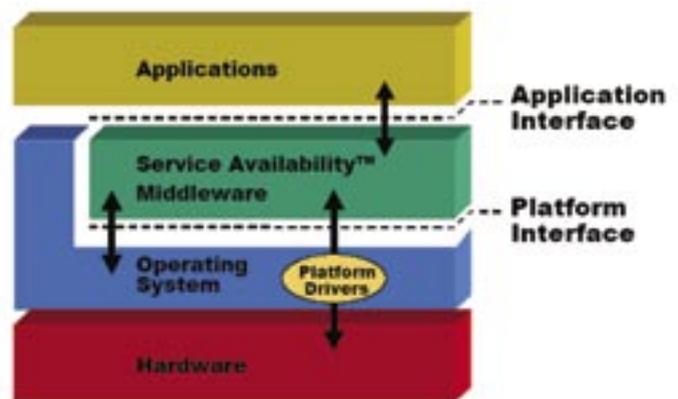


Figure 1

The reference architecture interfaces define the flow of information between objects defined in the architecture. While there is one specific service availability middleware entity in the reference architecture, this component performs the management function for service availability. The other objects in the architecture are expected to be able to provide the information required across each service availability interface defined in the reference architecture.

The reference architecture and interface standards of the SA Forum target circuit and packet switched networks, wireless networks, and cable-telephony networks. So, the interfaces are truly defined to support the convergence network of the future.

SA Forum registered products

In order to be realized in deployed solutions, the SA Forum requires support from a variety of vendors, suppliers, and customers in the communications industry. Component and board manufacturers need to build platforms that can provide statistics and managed interfaces for redundancy, hot-plug, and hardware failover. Operating system providers must offer extensions to the operating system for SA Forum interfaces in addition to mak-

ing the internal operating system software inherently reliable. Systems and applications providers must utilize the SA Forum interfaces to create innovative, highly available network applications that can generate significant revenue streams for network operators and service providers.

Operating systems serve as an especially critical reliability component within the HA software environment. The operating system is the software foundation of any communications system component sporting a CPU. Operating systems that use a memory management unit in the CPU and maintain user and system state to minimize damage that can be done by accidental or malicious corruption by applications are critical to the HA environment.

Process model operating systems are better equipped for keeping reliability and maintainability in this kind of environment. These systems track and monitor memory allocated to processes. If any process attempts to access memory outside its allocated memory, the operating system isolates the attempt, then contains and isolates the process, limiting the damage done to the offending process's domain. Threads that model only operating systems, or applications that make use of threads, open the door to memory corruption in the environment. Threads that have access to all system resources have the ability to compromise the service availability environment at its core, rendering the system vulnerable. For this reason, application writers must use protected execution domains, along with process model operating systems, to ensure the reliability of the SA Forum compliant system.

Five companies currently have SA Forum registered products on the SA Forum website:

Augmentix has a spectrum of products available that are compliant with the latest SA Forum standards. Customers can purchase the Hardware Platform Interface (HPI) software alone, software with hardware platform components, or the entire SA Forum-compliant platform, ready for application development. Augmentix has an off-the-shelf HPI software solution suite that conforms to the B.01.01 SA Forum HPI specification. A Server Availability Management Processor card (A+SAMP) provides plug-in management and service availability functions for systems with a PCI interface. One compelling feature of this management card is its ability to provide *lights out* management whereby the card has the ability to manage the host system even upon failure or power loss to the system. The A+SAMP includes an Augmentix service availability software package as a bundled management solution. Finally, Augmentix offers complete repackaged service availability servers based on the Dell PowerEdge server product line. These innovative products provide the ability for equipment providers and network operators alike to deploy SA Forum solutions today. For more information, visit www.augmentix.com.

GoAhead Software has an implementation of the Service Availability middleware shown in the reference architecture of Figure 1 called *SelfReliant 7500 Advanced Suite*. This suite is compliant with the SA Forum B.01.01 specification and implements an HPI management console, with database management and replication services. For more information, visit www.goahead.com.

Intel is offering carrier grade rack-mount servers. One of these servers, the Intel TSRLT2, is a NEBS-3 and ETSI certified carrier grade rack server. The system comes with floppy and CD-ROM drives, redundant, hot-plug power supplies, USB, PS/2, and video

connectors, as well as slots for PCI cards and SCSI drives. Status lights on the front panel provide indications for service availability and Telco Alarm management, both audible and visible alarms. Visit www.intel.com/design/cgserver/telecom/tsrlt2/ for a more detailed look at this HA server.

MontaVista has released version 3.1 of their Carrier Grade Linux package. This implements the functions of the operating system block of the SA Forum reference architecture. System serviceability features such as kernel resource monitoring, field-safe application debugger, and runtime application patcher provide operating system functions that support the goals of the service availability environment. In addition to these kernel extensions the operating system also supports SA Forum features such as cluster membership services, application availability management framework, and a checkpointing service. For more information, visit www.mvista.com.

UXComm is a company that specializes in data center automation products. They have a product called AutonomIQ Distributed Element Management (DEM) that specifically relates to the SA Forum and the HPI specification. The DEM product is one in a suite that provides hierarchical management and control from the hardware platform itself through the IT infrastructure in order to efficiently manage and automate data center activities. The DEM product provides discovery, monitor, and control functions using a policy based management framework for bladed environments. It provides web and command line interface interaction that can pull widely distributed information to build *system specific dashboards* for monitoring this information. For more information, visit www.uxcomm.com.

SA Forum: What's next?

It appears that the SA Forum has significant momentum and real products available that implement the specifications from hardware platforms, operating system, service availability middleware as well as bundling solutions. Some of the companies providing these solutions have applications focused on the management and control of these functions. But where are the rest of the applications that will drive revenue generation and additional service offerings for network operators? With the SA forum foundation complete, the successful proliferation of SA Forum standards will depend on the emergence of applications that conform to the SA Forum application interface. Aside from focused management offerings, applications using the SA Forum standards were noticeably absent. Now that the foundation is set and SA Forum compliant server products are available, I would expect member companies such as Oracle, IBM, and MySQL to start to announce application-level product offerings that fit into the SA Forum reference architecture.

Additional information on the SA Forum can be found at www.saforum.org.

For further information, contact Curt by e-mail at cschwaderer@opensystems-publishing.com.