

TCA for Embedded Systems

Software components need to be designed to function using OS/Platform abstraction, common execution environment, targeted for embedded devices and easy migration to new platform. This article brings Tata Elxsi Component Architecture (TCA), which is designed and developed for Embedded and Generic networking applications. TCA is integrated in various customer products (Digital Still Cameras, IP Set top box, Printers, DLNA Media Server, DLNA Media Player devices) in ASIA and USA.

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Tata Elxsi has rich expertise in developing firmware and embedded applications for a wide range of products used in the areas of automotive controls and infotainment, consumer devices, network telecom, media, wireless, and scientific instrumentation. With a decade long experience in designing embedded systems for products, Tata Elxsi delivers significant value to product manufacturers in architecting systems and deploying technologies in an embedded setting. Tata Elxsi's embedded expertise covers application development and optimization over a wide range of popular RTOS platforms and proprietary micro-kernels. Proven quality processes designed for embedded product designs, and over 5000 person years of embedded development experience makes an ideal partner to go with for the most challenging embedded tasks.

Tata Elxsi Component Architecture (TCA), which is designed and developed for Embedded and Generic networking applications. TCA is integrated in various customer products (Digital Still Cameras, IP Set top box, Printers, DLNA Media Server, DLNA Media Player devices) in ASIA and USA.

All software products are designed to meet the following objectives.

- **Portability:** The software is completely independent of the target processor, native platform and system services.
- **Easy of Maintenance:** The code must be uniform and easy to understand and maintain.
- **Common Architecture:** A common framework by which a new software component can be easily implemented with well defined set of functions, uniform ways of implementing common elements. Tata Elxsi Component Architecture (TCA) is a proprietary architecture, provides a common platform for building components. All Tata Elxsi software components are developed using TCA. TCA provides a uniform interface to operating system services. All the operating system related functionality is abstracted out in the TCA, which dramatically reduces the time and effort needed to port the component to a new platform. TCA common architecture allows customers to integrate, adapt and modify the software rapidly into a wide range of product architectures.

Component

The Component is the realization of the technical standards/concepts. These components assume the required Operating System and Platform Service is available. Component will always use the

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services provided by TCA Service Modules and does not directly interact with the target system.

E.g., TCP/IP stack, ATM signaling stack, ISDN stack, SNMP Agent, Networking Applications like DNS, DHCP, HTTP etc., are considered as components that utilize TCA services

TCA Services

TCA provides the following set of services to components and applications:

- Registration Service
- Memory Manager
- Timer Manager
- Task Manager
- System Service
- Diagnostic Service
- Service Access Point (SAP).

TCA (Tata Elxsi Component Architecture)

TCA enables to achieve the following objectives in Embedded System development.

- Robust Portability
- Minimal Integration effort
- Processor and operating system independent for maximum flexibility
- Ease and orderly inclusion of new features/components
- Rich set of compiler options to select

Components/Applications

Tata Elxsi component Architecture

Native Operating System

Hardware Platform

appropriate features and functions

- Diagnostic Support
- Flexible architecture enables replacement of specific system service Implementation

State of Art and TCA

TCA architecture is compared with two popular Component Architecture and Abstraction Services.

- TCA facilitates the common executive environment for the components built over it, making the platform independent.

TCA Services	Competing Generic Component Architecture	Product/Customer Specific Component Architecture
Registration Service	NO	NO
De-Registration Service	NO	NO
Memory Manager		
Timer Manager		
Task Manager		NO
System Service		
Diagnostic Service		
SAP Primitives		NO

- Time to market of components will be greatly reduced
- Besides acting as OS abstract layer, it provides additional services for network packet manipulations and emulates various OS services irrespective of whether Native platform supports it or not.
- By TCA registration mechanism any misbehaving component can be kept at bay from hogging up all the system resources.

Conclusion

Tata Elxsi Component Architecture ensures portability across various platforms. TCA abstracts the functionality of various Operating Systems into a generic, portable interface that can be used to isolate the software from the native platform. TCA is available on many platforms like Linux, uiTRON, VxWorks, pSOS, Proprietary RTOS etc.

Author's Profile

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