



Elite Software R&D Services
Since 1990

Auriga: Software Development Services for Medical OEMs

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General Overview

Founded in 1990, Auriga is an IT outsourcing company providing software development and maintenance services to R&D/engineering and IT departments. Auriga has 15 years of experience combining onshore account and project management with offshore software engineering talent to efficiently deliver top-quality, low-cost outsourcing services.

In the complex world of medical technology, proven experience and expertise are critical assets. Auriga is committed to sharing its competence to anticipate and meet your needs. Our portfolio of industry-focused solutions spans a range of services from custom medical device software development to software validation and independent safety testing. Auriga understands the special requirements of the medical OEM and ensures that our customers not only receive quality software services, but also full compliance with current FDA and European Community regulations.

Auriga works within the CMMI-based quality management system. The processes at Auriga are CMMI Level 3 compliant. To provide 21CFR Part 820 compliant solutions and to deliver its services in strict accordance with the client standards, Auriga augments its CMMI-based processes with clients' standard processes that cover such practices as hazard/safety testing, et cetera.

Auriga Benefits:

- Auriga's knowledge of the standards and processes used for the development of software products for medical device industry;
- Auriga's unique expertise in firmware and driver development allowed to implement innovative solutions in medical device industry;
- Auriga's development team quickly gains the expertise in client's software internals and delivers complex projects on time and on budget;
- Auriga's optimized processes allow to increase quality by performing code reviews (done offshore) throughout the development phase and to decrease product development cycle time by incorporating test development at the beginning of the development phase, rather than towards the end, thus decreasing the QA cycle and offloading work from the client's onsite development and QA teams.
- Auriga's testing team constantly receives excellent evaluations from customers, acknowledging the exceptional level of Auriga's testing services.
- Auriga's experience in testing 3rd party components in order to verify their compliance to the standards used in medical device industry ;
- Auriga's diversified, time- and result-proved porting experience ensures smooth porting from expensive proprietary platforms to open-source Linux-based ones, expanding the range of global markets, increasing legacy margins worldwide, and decreasing dependency on pro-

prietary platform manufacturers.

- Auriga's efficient staff management allows to utilize engineering resources flexibly, quickly adding them to literally any development/testing area exactly when they are needed.

The most recent example of Auriga's experience with a large medical solutions provider is the cooperation between Auriga and Dräger Medical, one of the world leaders in medical equipment manufacturing. Auriga was chosen by Dräger Medical. as a software outsourcing service provider, because it offered the best combination of engineering experience and price, as well as outstanding experience in high availability software development, along with a high level of customer service—even the Aberdeen Group used the relationships between Auriga and one of its clients to exemplify one of the best practices in software outsourcing. The collaboration between Auriga and Dräger Medical began in 2003 and has been efficiently continued since. In 2003-2005, Auriga successfully completed a series of projects for Dräger Medical. At Auriga, Dräger Medical takes advantage of both dedicated and project-based approaches.

Here is an excerpt from Sam Cavallaro of Dräger Medical on his satisfaction with our company's service and expertise: "Excellent engineering. Excellent price." At Auriga, we are very proud of the work we have done for Dräger Medical so far, as well.

Recent Representative Projects Samples

Central patients data monitor in a large hospital-scale medical network

Project Overview:

The core product, a central patient data monitor in the medical network, integrated with life-supporting medical equipment, developed in-house by the Customer, was based initially on AIX/PowerPC platform. When the Customer encountered the need for porting the system to Linux and Intel, the task was outsourced to Auriga in full. Auriga received the original code and performed porting as well as full-cycle integration testing. As the result, a newly ported product with limited functionality was built. While proceeding with porting- and testing-related tasks, Auriga's engineers discovered a considerable amount of non-portable code as well as some system and compiler bugs, reported them to the Customer and fixed.

Tools and Technologies:

- Mandrake Linux
- C++, GCC
- MOTIF
- Debugger/profiler tool: Valgrind

Development of a new version for a critical care workstation

Project Overview:

Given the efficient performance demonstrated by Auriga constantly, the Customer decided to outsource one of the strategic tasks—the development of a new version for one of the leading products from the Customer’s product line—a critical care workstation, that displays clinical information from a variety of sources.

Within this project’s frameworks, the Auriga team performed the following activities:

- Full cycle software development (product requirements elaboration, design, prototyping, coding, testing, bug-fixing, optimizations);
- Integration of full set of 3rd party applications into the product;
- Participation in the formal verification processes that are used for this product.

Tools and Technologies:

- C/C++, XML
- Visual Studio
- Syngo, LiteStep
- Windows 2000/XP/XP Embedded

Development of device drivers for a modular component monitor

Project Overview:

While working for the Customer, Auriga’s engineers created a number of drivers to support a PCI card, allowing the main processor of Kappa monitors to communicate with other system components. Within the scope of this project Auriga’s developers performed successfully the following tasks:

- Device drivers development;
- 3rd party device drivers integration;
- Access library creation;
- Solution testing.

Tools and Technologies:

- Windows Driver Model compliant device drivers
- C/C++

Development of a boot loader for a patient monitor

Project Overview:

The RedBoot boot loader was ported by Auriga to the Customer’s platform, as well as enhanced with the network firmware upgrade support. The following tasks were successfully completed:

- Porting the RedBoot boot loader to the Customer’s platform;
- Creating a module for boot loader that downloads the data

via TFTP, puts in Flash, and performs other firmware-specific actions;

- Creating a TFTP server that can run on the Customer’s critical care workstation.

Tools and Technologies:

- Boot loaders: RedBoot
- TFTP
- Flash memory
- Memory Card
- C

Development of a remote view subsystem for modular monitors

Project Overview:

This subsystem, delivered to the Customer by Auriga, enables remote connection to a patient monitor that is important for life-critical patient monitoring systems. The subsystem allows using a patient bed-side monitor for viewing the vital information and patient conditions from other bed-side monitors. With this subsystem installed, a nurse while being at one patient’s side, do not have to go to a central station to check the situation on other patient monitors, she has all the information at hand.

Auriga performed the following activities:

- Implementation of a data storage solution for remote data
- Updating visual elements to display both local and remote data
- Integration into existing system architecture
- Testing and debugging for various types of devices.

Tools and Technologies:

- C/C++, XML
- Syngo, ACE
- Windows XP/XP Embedded

Platform porting to Windows CE

Project Overview:

Taking into account the extensive porting experience, Auriga proved, the Customer requested Auriga to research the ability to port one of the Customer’s software platforms from Windows XP to Windows CE.

Having effectively resolved numerous technical issues coming from the differences between Windows XP and Windows CE systems, the Auriga team provided a proof-of-concept using a preliminary version of the platform and defined the approach for porting of the production version. Later the porting itself was accomplished by Auriga as well.

Tools and technologies:

- C/C++/ Win32
- MS Visual Studio/Win CE Platform Builder/eVC++
- Windows XP, Windows CE



System-level components development

Project Overview:

Auriga, while working for the Customer, delivered efficiently several projects aimed at robust system-level components development, including but not limited to registry trap service (registry back-up and restore service compatible with the Windows XP Embedded Hibernate Once/Resume Many (HORM) feature), health monitor application (system health metrics and components state monitoring application), etc.

The usual project scope covered by Auriga for the projects of this kind encompasses:

- Requirements gathering;
- Design and implementation;
- Robust system service development;
- Flexible XML configuration set up;
- Testing and verification;
- Product integration into the Customer's components environment.

Tools and Technologies:

- C++
- XML
- Windows, WDM, API hooking, Sockets programming, WMI
- Microsoft Visual Studio .NET 2003
- Microsoft DDK

Testing framework development and implementation

Project Overview:

In the effort to bring flawless products to market, the Customer pays serious attention to software testing and verification processes. To test and provide diagnostics for various components of the Customer's strategic products, Auriga performed the following activities:

- Definition of the test specifications and manual test implementation;
- Design and implementation of complex automated testing frameworks based on Rational Robot and CppUnit unit testing library;
- Testing scripts development;
- Design and implementation of several debugging and inspecting tools;
- Unit tests implementation in accordance with high-level component requirements
- Integration of resulted products into the Customer's components environment.

The Customer's dedicated testing team at Auriga works continually, showing excellent and in-time results in verification reports delivery and bug tracking. Auriga's testing team constantly receives excellent evaluations from customers, acknowledging the exceptional level of Auriga's testing

services.

Auriga's contribution in verifying the functionality of the complex medical software, where quality is of special importance, allowed the Customer to deliver high-end solutions of exceptional quality in time.

Tools and Technologies:

- C++,
- CppUnit
- Rational Robot
- XML
- Windows
- Microsoft Visual Studio .NET 2003

Verification of Microsoft HotFixes (QFEs) for the medical environment

To ensure all Windows-based medical equipment software of the Customer against possible vulnerabilities, HotFixes released by Microsoft on the regular basis are applied to the target systems. However, Microsoft does not certify its HotFixes for the highly regulated medical environment, so prior to installing them on the Customer's medical equipment all over the world, the Auriga testing team selects and analyzes the proper HotFixes, tests them in the appropriate FDA controlled environment to ensure they do not affect the operation of the medical software, and develops verification reports for the Customer. Auriga continually performs such activities on the regular basis.