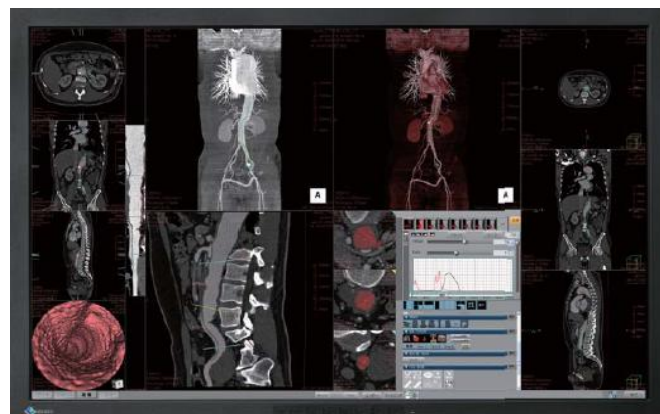




Display Calibration Software

Migration - Windows to Mac OSX



Executive Summary

The client firm, a world-renowned health care solution provider (OEM), faced a great challenge. Its sales commitment was at stake: a brilliant sales effort brought in a customer, willing to buy 50 medical grade display panels, but the customer needed Mac OSX (Apple) compatibility. Without in-house Mac software development capability and with reluctant vendors expressing little interest in taking up the 6-month duration, tight deadline, strict conditions migration project, it faced a high-risk. Mindfire's excellent experience with Apple Mac OSX development and migration/porting helped establish the initial trust level with the client firm. Mindfire delivered a full scale, extensible virtual team setup, with experienced resources, finally delivering the project successfully, considerably benefitting the client firm. The client could honor its sales commitment having successfully outsourced the software migration, with its existing engineering team collaborating with Mindfire on domain-expertise.

About our Client

Client Medical Imaging Display OEM | **Location** USA | **Industry** Health Care (Medical Imaging)

Business Situation

The client firm (an OEM) had a great opportunity to sell 50 medical-grade display panels but its customer used Apple machines (Mac OSX based computers). The display-configuration management software for the panels required Windows OS – there wasn't any Mac version. Fortuitously, the customer willingly allowed a 6-month period for software migration, considering the quality of display panels on offer. Successful migration to Mac OSX thus became crucial to, what could possibly be a half a million-dollar deal. Our client didn't have in-house Mac development expertise & six months was too short a time to do head hunting. The client's VP-Engineering worked hard trying to locate a vendor with proven expertise and project-execution capability. Established vendors showed lack of interest & willingness in taking on such a high-risk project – considering strict timeline and conditions. Mindfire offered its services and claimed client's confidence showing expertise in related domain and technical areas, as well as the remote work protocol. Initial discussions included shared development, communication and collaboration plans, prior experience and success commitments/guarantees - integrated change management with risk aversion and mitigation plans.

Solution Details

The Mindfire Solution

During the project specifications discussions we observed that the existing display-configuration management software continued to be developed and refined over the last 5 years, attaining unmatched stability in its category. Since the success of the project greatly depended on the product knowledge, difficult to acquire in such a short time, we took benefit from the expertise of the client's existing engineering team. Close coordination ensured the high quality and stability of the Mac software port, comparable to its existing Windows version. We initiated a team of 7 engineers led by a Senior Architect, a Technical Lead, and a Project Manager to quickly study and analyze the existing software and its source code, to come up with the right porting strategy. Needing a focused approach, we split the project into 2 phases – the first one encompassing the necessary requirements, and the second one covering feature additions.



Achievements

The project expanded Mindfire's expertise in Medical Imaging DICOM Calibration domain and leveraging Mac OSX IOI2CInterface technology for Medical grade displays. With experience in providing virtual teams to numerous clients, Mindfire used its unique remote development methodology (based on critical success factors), with a strong understanding of the subtleties of distributed & synchronous/asynchronous collaborative efforts, once again establishing its ability to execute time-critical projects with a strong engineering orientation towards success.

Technologies

Mac OSX, Objective-C, C++, CFPlugin, Cocoa Distant Objects, CGDirectDisplay, ColorSync, Core Image, IOGraphicsLib, IOPMLib, IOI2CInterface, Launchd Daemons and Agents, Apple System Logger, Mach Port, Distributed Notifications, AppleScript and OS Script, Microsoft COM, DICOM Gray Scale Display Function, Display Calibration, DDC I2C

Final Results

Software system

BXtra for windows adds essential functionality to medical imaging display systems in diagnostic and referral settings. The suite of value-added services can be it used to calibrate and maintain displays, run acceptance tests, and monitor displays settings. BXtra **services** operate as independent plug-ins, each use the Reporting service for listing properties, logging events, and saving history. BXtra **system tray (framework) application** serves as the basis for the user interfaces presented by BXtra Services, which are functional entities, exposed to the user. The tray application presents Windows system tray icon and the context menu to the user. BXtra Tray Protocol is defined to manipulate the tray icon and add/remove items from the context menu. The services are installed in the BXtra Framework as independent components and communicate with the framework using the BXtra Protocol. The **hardware interactions** in BXtra have been architected to allow the display/panel abstraction layer as a set of COM interfaces to be built separately from BXtra Tray App (framework). These COM interfaces collectively make the Hardware Abstraction Layer. The following **services** constitute the BXtra software:

- *RightLight™* – Assures backlight stabilization for your display panel, calibrates your panel to the DICOM Grayscale Standard Display Function, automatically tests the calibration for conformance, allows manual conformance testing, and supports DICOM calibration at various color coordinates on EX color displays
- *Test Patterns* – Provides test images and allows use of custom test patterns for demonstrating and evaluating the performance of your display
- *Privilege* – Password-protects operating parameters of the display system
- *Reporting* – Collects/Displays/Prints configuration data, characteristics, & event logs created by other services
- *Enterprise Management* – Manages displays from a central location

Porting from Windows to Mac covered the following features:

- Plug-in architecture where each services is installed as a plug-in to the application
- Abstraction layer to allow support for multiple display adaptor types and panels
- Support for NVIDIA display adaptor
- Choice to load DICOM or native response on a per panel basis
- Manual DICOM conformance check with selectable number of points
- Display and print conformance check result graphically with linear or log-linear modes; Save results to a file
- Support setting tolerance for auto-checking of conformance, with logging and warning capabilities
- Application Finder bar Icons to distinguish between normal, warning and error conditions
- Non-privilege and password protected privilege modes

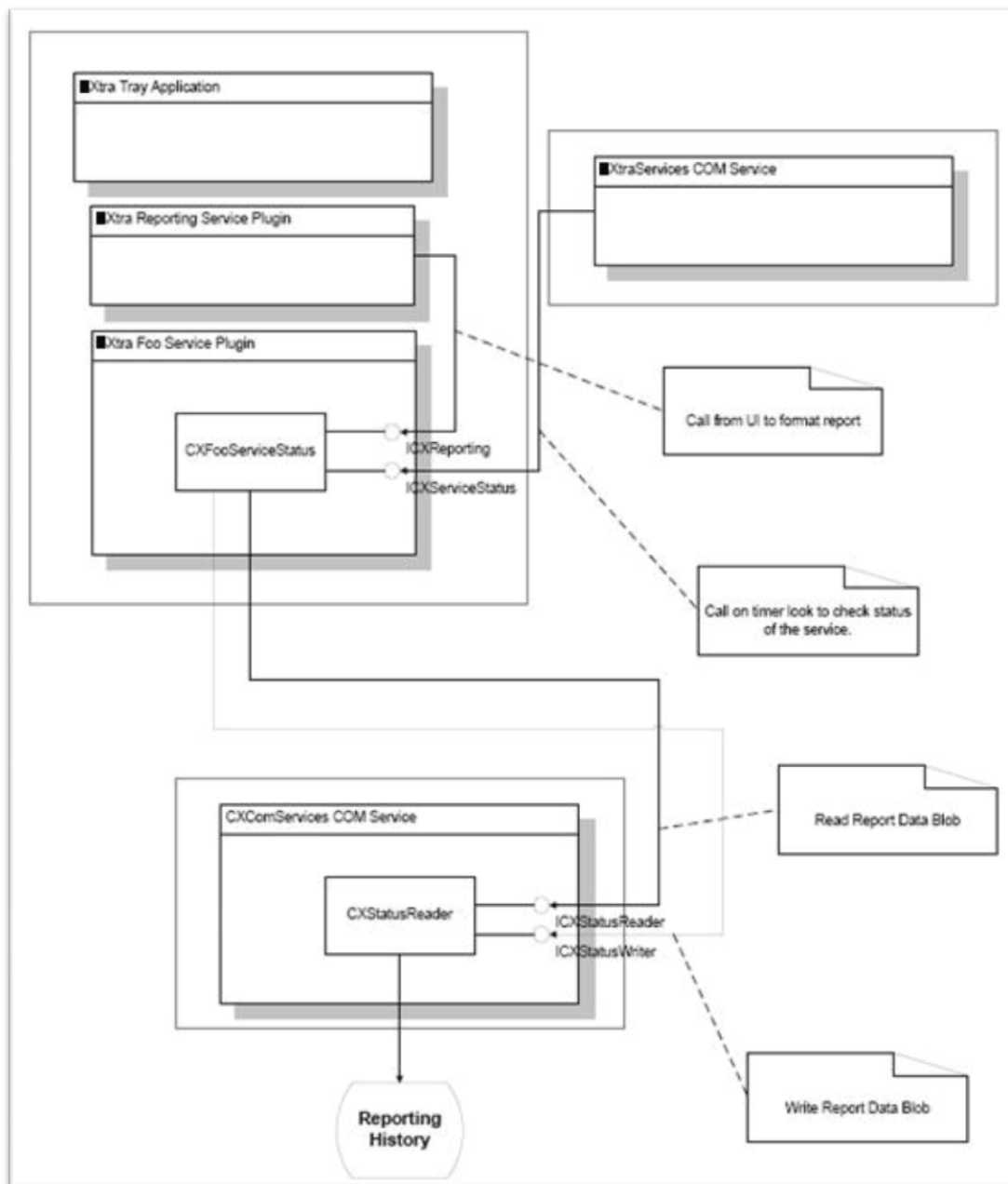


Figure 1 Basic Design Diagram

Customer benefits

Mindfire brought success to the client firm, which was facing a great loss on sale and reputation in delivering excellent medical imaging equipment. The client firm -

- was able to honor their sales commitment
- got a flexible and interactive team to work with
- could leverage strong Mac OS X expertise and multiple high skill areas, including access to Apple developer support incidents, and access to prerelease for Snow Leopard (Mac OSX latest version) for testing – as Mindfire is Apple Premium Partner, and
- found a long-term cost-effective outsourcing partner with proven expertise and capabilities