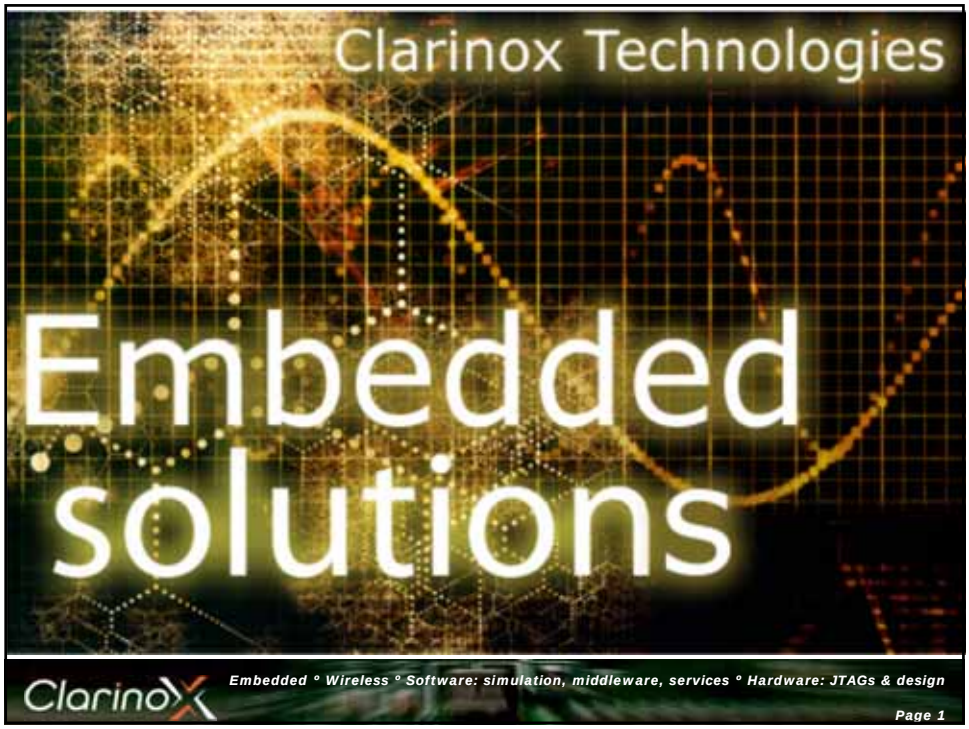


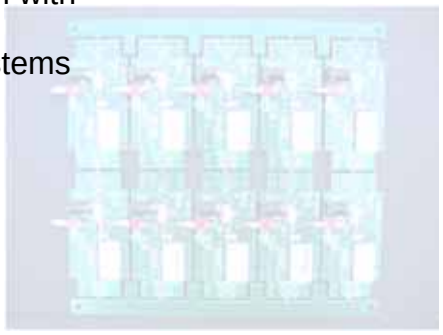
Contents

- Mission
- Clients, Tools & processes
- Industry Issues
- Clarinox solution
- Project examples

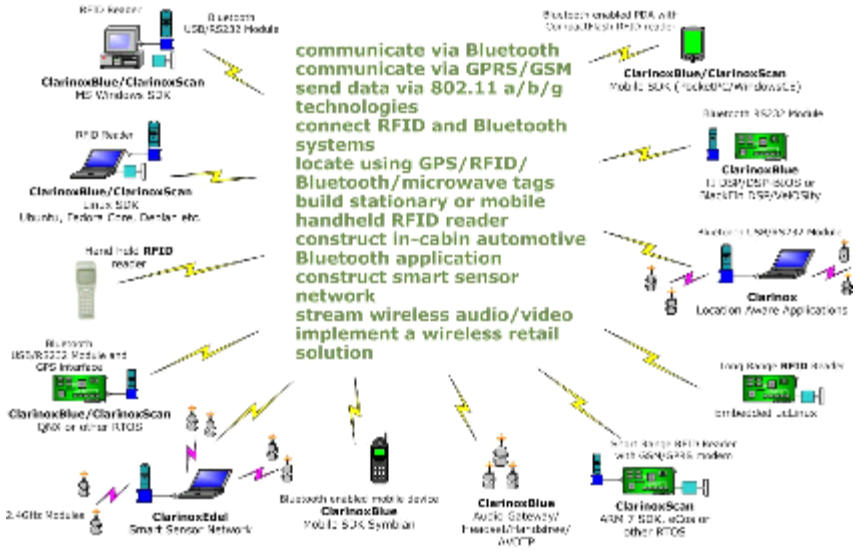
Gokhan Tanyeri
Clarinox Technologies
www.clarinox.com
9095 8088

Clarinox

- Operating since 2001
- Vision: to assist our clients get reliable embedded products to market quicker
- Partner program participation with Microsoft, Intel, QNX, Xilinx
- Products and embedded systems engineering services
  - C/C++
  - Wireless protocols
  - Debug tools
  - VHDL
  - PCB design



Solutions for embedded systems



Clarinox Clients/Alliances

- DTC/Cobham
- Cochlear
- Polaris
- Tata Consultancy Services
- Keycorp
- Orica
- Telstra
- Digital Spark
- Guardian Products
- Phicom
- Australian universities, NICTA

- BlueAnt
- NEC
- Advertiles

- EWA (BlackHawk)
- REMCOM
- QNX
- Xilinx
- TI

Procedures & processes

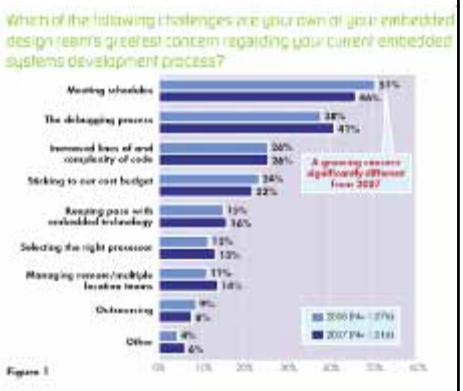
- Project management / Risk management
- Application of modern techniques
  - Object oriented / Aspect oriented
- Research into new technologies
  - Wireless / CPU / RTOS
- Version control
- Bug tracking
- Auto-documentation
- Clarinox coding standards
- Test
  - methodologies, scripts, automated tests, Regression, FAT documents

Quality & Standards

- Bluetooth SIG V2.0 + EDR qualification
- Design compatible to ISO15693, ISO18000, EPC Global standards
- Finalist in 2008 ATS patron's Award
- 2009 iAwards Victorian Merit Award Software Tools and Infrastructure
- 2009 EDN Best Design Software Award Clarinox presented papers at
  - WiCon Asia - WiCon US – SynergyTurk - Industrial Wireless
- Papers published in trade magazines
  - What's New in Electronics - Radio Communications
- University guest lectures and industrial project supervision

Issues impacting implementation

- Key Issues
  - Time to market
  - Debugging
  - Increased lines of code
  - Increased complexity
  - Keeping to budget
  - Keeping pace with technology changes
  - Selecting the right processor



All these concerns of embedded systems developers impact upon design cycle

Time to market

- Code reuse
- Risk reduction
- Improved debugging tools
- Removal of application from platform details
- Handling of complexity
- Use of off the shelf components

Debugging

- Use both high and low level debugging tools
- Have built-in unit testing in your code
- Make sure that your code can also run on a desktop
- Have integrated debugging architecture in your code
- Use memory management tools
- Use of profilers
- Use and re-use proven and well-tested software components

Trends in embedded

Complexity drives uptake of software

- trend : "developers move away from internal/proprietary operating systems and toward commercial alternatives...."
  - *www.embedded.com*
- "The size of the average design team increased slightly,.... But it's interesting to note that the number of software engineers on the team increased by almost two, meaning the number of hardware engineers stayed the same or was slightly reduced. "
  - *2008 embedded survey:*

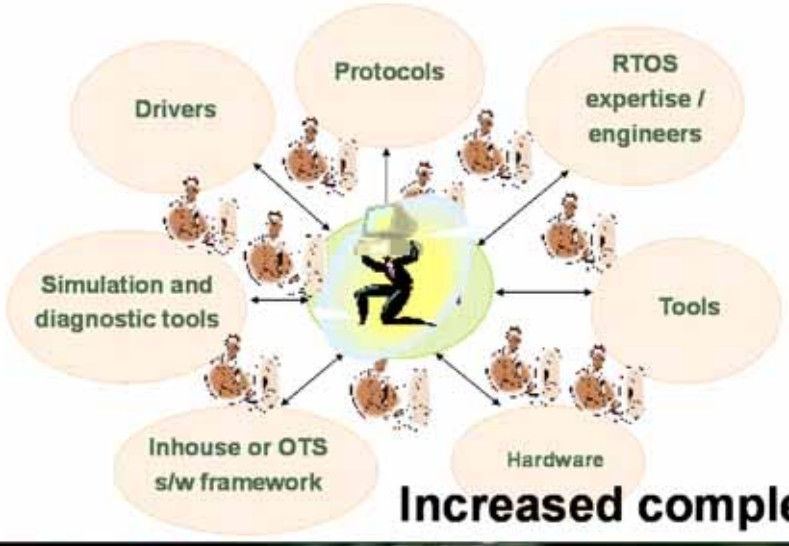
Trend to increased spend on software, middleware will continue to emerge as complexity continues to increase

Code complexity (and lines of code)

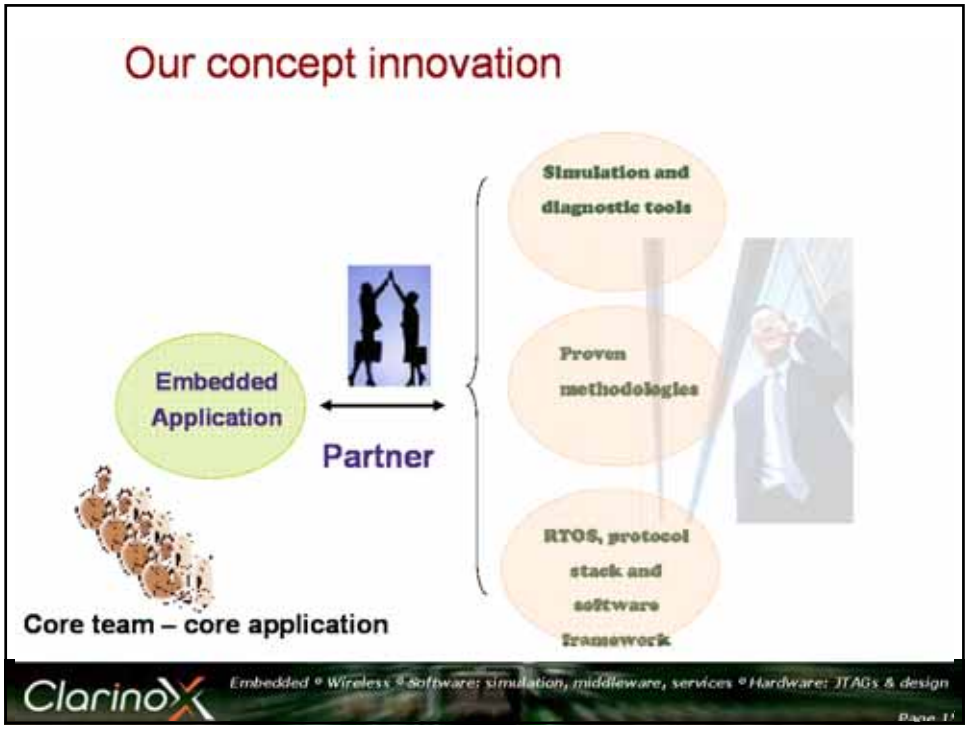
- Use of modern architectures
  - Methodology driven design
  - Patterns
  - Object oriented
- Use of off the shelf components
- Code re-use
- Automated code generators

Keeping pace with Technology

Trends in embedded



Increased complexity



Overview of ClarinoxSoftFrame

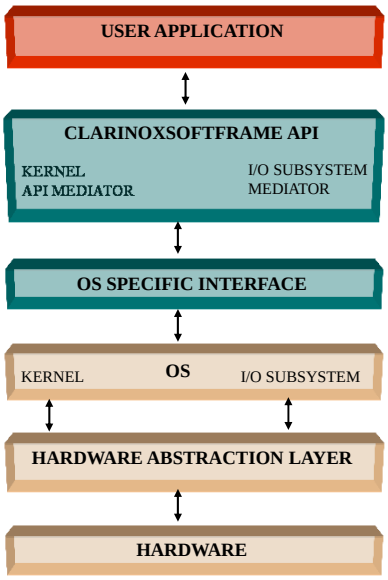
- **Standardises application development**
- **Reduces errors**
- **Reduces development time**
- **Reduces complexity**
- **Removes need to know RTOS details**
- **Removes requirements porting**
- **Provides faster time to market**
- **Shortens learning time on new projects**
- **Allows greater reusability of application code**

Portability

1. **Run here**
2. **Recompile**
3. **Run there**

OS/RTOS
- •Windows
- •WinCE
- •WindowsMobile
- •Linux
- •embedded Linux
- •eCos
- •uITRON
- •QNX
- •VelOSity
- •TI DSP BIOS

Processors
- •DSP
- •OMAP
- •DaVinci
- •ARM7
- •ARM9
- •PowerPC
- •Intel 80x86
- •Pentium

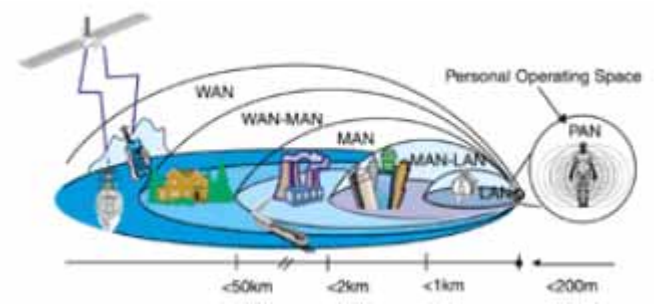


Application Framework

- Heart of ClarinoxSoftFrame concept
- Core for application development
- Consistent application architecture across all supported platforms
- Object Oriented applications deployable across multiple platforms
- Develop and run on desktop for extremely fast turnaround time
- Then deploy on choice of multiple supported embedded platforms
- 10 sec vs 2 min – each programmer, many times per day

Protocol Stacks

- Wireless technologies
- Bluetooth
- Wi-Fi
- ZigBee
- GSM/3G
- RFID
- Low power RF
- UHF



Tools Library

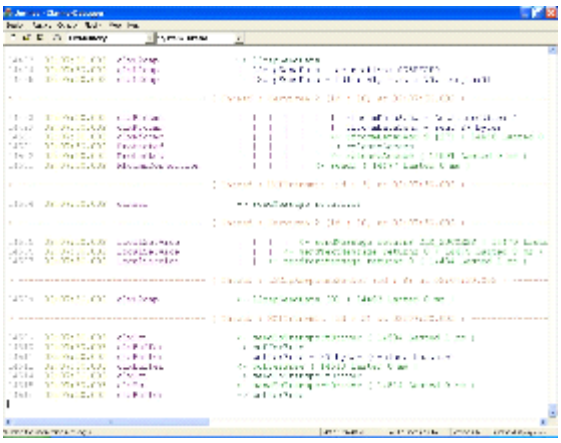
- Completing the picture for fast consistent application development and testing
- Eliminate the hassle caused by varied behaviour of different compilers
- Fragmentation free memory management
- Memory leak detection analysis
- Deterministic response from standard library functions
- Lightweight embedded list, array, stream, classes
- HTTP, sockets support

Configuration

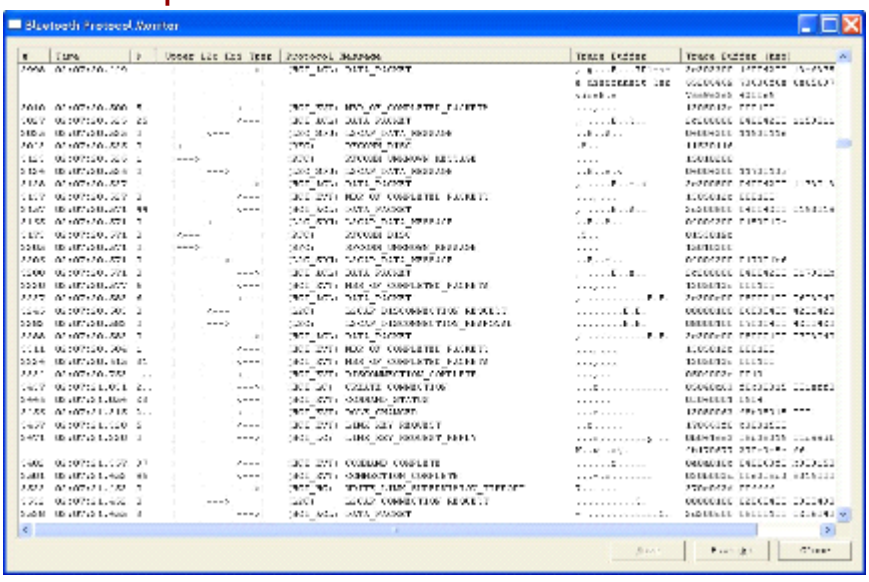
- Interface provided to change parameters without requiring compilation
- Immediate control over the working of the application
- Plane Text or XML configuration

Trace / Debug / Profiling

- Faster debugging
- Colour coded
- Ready separation of code components
- Debug complex static and **dynamic** issues
- Plug-ins
- Many connection methods available
- Consistent across supported platforms



Sample Bluetooth Protocol Trace

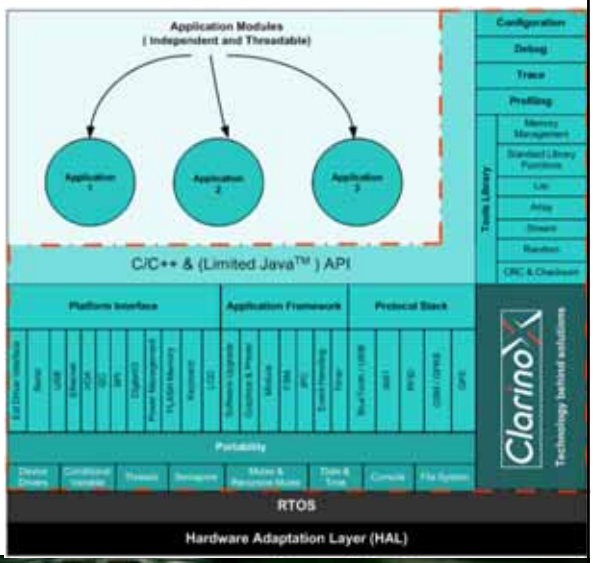


Points of Difference:
Why ClarinoxSoftFrame is Unique

- Deploys modern software techniques to embedded systems such as use of proven software patterns
- Strong mix of functions and features focused on market needs
- Enables companies to compete with small engineering resource
- Debug messages that convey both static (compile-time) and dynamic (run-time) bugs
- Same API across open source and proprietary platforms

ClarinoxSoftFrame

- Application developers can work on other projects on any other platforms
- Our approach minimizes the potential for error due to the reduction in the complexity of the task
- Application programmers can concentrate on their core application instead of learning platform specific details
- Robust
- Reduces time & cost
- Upgradeability & future proof



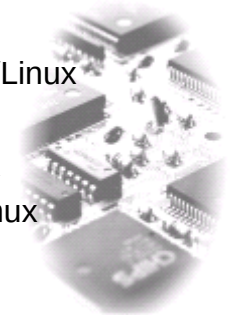
Project experience

- Cochlear – Bluetooth and proprietary communications
- Vassah – Bluetooth for nurses stations; weight scales, blood pressure

- Bluetooth – DTC, TCS, TMC, Phicom, BlueAnt
- GPRS – Advertiles, Hypercom
- RFID – Orica, Ford
- Embedded – Polaris, Keycorp, NEC

Project ARM experience

- Atmel AT91FR40162 ARM7 – eCos
- NXP LPC2290 ARM7 - eCos
- Samsung S3C24x0 ARM920T – WindowsCE/Linux
- StrongARM - WindowsCE
- OMAP 5912 (TI ARM 926EJ + DSP) – eCos/Linux
- OMAP L137 (TI ARM 926EJ + DSP) - Linux
- DaVinci 644x (TI ARM 926EJ + DSP) - Linux
- OMAP 3530 (TI ARM Cortex A8 + DSP) - Linux



Project experience

- Child tracking utilizing Bluetooth technology
- TMC Radio
- FUJITSU AUSTRALIA FSX2000 Next Generation Digital Loop Carrier
- FUJITSU AUSTRALIA Dandenong MFG 68332 based test equipment
- Bluetooth ASIC SOC collaboration with VU
- Inhouse SoftFrame and ClarinoxBlue development
- Keycorp POS solution
- Tata Consultancy Services Bluetooth Audio Tour

Project experience

- Orica electronic tagging
- Digital Spark electronic wayfinding for vision impaired
- Invetech MPC860 PowerPC
- VESDA 8051 based smoke alarm
- Intelligent Battery charger
- DTC Bluetooth audio gateway
- Spatial hearing platform
- TCS BeATS
- Advertiles, digital signage panels

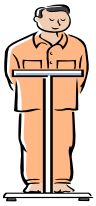
Examples

Remote Medical professional

Bluetooth to local hub – 100m ClarinoxBlue

GPRS – WAN ClarinoxGPRS

RFID to identify patient – 10cm ClarinoxScan

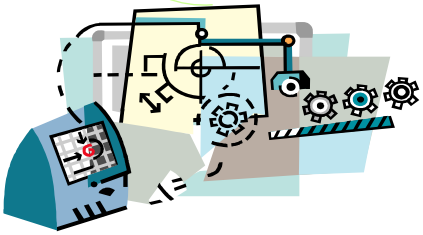


Weight scales

Examples

Remote Engineering professional

GPRS eg machine set point change



Bluetooth to workers in vicinity