



MICROEJ[®]

Modern “Software Factory” for embedded systems

Accelerating Time-to-Market by removing the difficulties of prototyping and development, while mitigating product design risks.



INTRODUCTION

The culprits are the ultra-sophisticated systems and software development, the added value that products need to convey and the growing complexity of the ecosystem on which they rely to exist.

Since the invention of the transistor back in 1947, the proliferation of electronic devices has been remarkable. Our lives intersect daily with systems containing an average of 200 to 400 integrated circuits. Our smartphones are an obvious example. It is less apparent when we take the elevator or wash a load of laundry. Powerful processors and small microcontrollers alike are ubiquitous and punctuate the lives of today's increasingly demanding consumers.

The Fortune 100 names in consumer electronics immediately spring to mind, but there also exist a variety of companies of all sizes that rely on electronic systems to differentiate their products and increase their performance and overall usability. These companies are increasingly exposed to cut-throat competition, which translates to an increased need to meet their time-to-market. The culprits are the ultra-sophisticated systems and software development, the added value that products need to convey and the growing complexity of the ecosystem on which they rely to exist.

In this ever-fragmented market we have assessed:

- 10,000 different microprocessors and/or microcontrollers to choose from
- About 50 different Real-Time operating systems along with about 100 software stacks (connectivity, communication, Human Machine Interfaces etc...) and 10 different compilers, etc.
- This equates to a mesmerizing 500 million different possible permutations in this "Matrix of pain"

COMPANIES STRUGGLE WITH HARD-TO-MEET PRODUCTION AND MARKET INTRODUCTION DEADLINES

It's an open secret in the electronics industry that solutions found by traditional methods are usually neither portable nor sustainable, and only very rarely economical.

Marketing is being held hostage by the inadequate tools and methods of R&D and engineering resources

To keep their competitive edge, marketing professionals need to imagine new products and services in order to either extend existing lines or create new ones. This process typically requires the R&D or engineering divisions to develop one or several prototypes. And this is where things get tricky. Indeed, while marketing directors demand applications or services with high added value, they must first rely on the know-how of their research and development teams to design the early prototypes of said systems.

Even when high quality design documentation is available, R&D teams often cannot cope with the plethora of possibilities at their disposal. While many vendors offer software components and tools, they are often outdated or incomplete with limited interoperability and sample code that conveys little or no guarantee of success.

Craftsmanship and ad-hoc techniques may have worked in the past but are not adapted to rapid and constant design iterations

Even the most talented R&D teams are ill-equipped to deal rapidly with the complexity of the task at hand (the infamous 500 million combinations). And so they resort to “boutique development”, which does eventually come up with a solution, albeit one that may not be reasonable in terms of costs, time and resources. Moreover, it's an open secret in the electronics industry that solutions found by traditional methods are usually neither portable nor sustainable, and only very rarely economical.

Antiquated homegrown systems and software development techniques make it near impossible to either industrialize the process of rapid prototyping or ensure brand consistency. For instance, applying a series of design iterations, and the same user-machine interface on a product family is a process that can be both lengthy and costly. And each new product family will use different electronics and invariably involve applying the same cycles of prototyping and productizing. These development paradigms are time-consuming and error-prone, and yet time is more precious than ever before and there is little (if any!) room for error.

MICROEJ SIGNIFICANTLY ACCELERATES TIME-TO-PRODUCTION



MicroEJ® is an embedded software vendor that combines 10 years of experience and counts among its customers large Fortune 100 companies such as Audi, Schneider Electric, Siemens, Atlantic, Orange, STMicroelectronics, Freescale, Renesas, Bouygues Telecom, SFR, Itron, Thales, ERDF, Delta Dore, ECA, DGA, STAGO, Carl-Valentin, GEMU...

MicroEJ is known for its standard, flexible and mature development platform that allows the marketing-development tandem to maximize creativity while avoiding costly impasses.

MicroEJ accelerates design validation: rapid prototyping and production readiness

The development environment can quickly become a nightmare for some of the stakeholders, given the difficulties of prototyping due to:

- The complexity and fragmentation of the hardware and software “stacks” markets
- The notorious lack of flexibility and interoperability in most programming environments
- The inability to port applications from one device or system to another
- The uncertainty of being able to ensure the maintainability of said systems
- The non-executable simulation requiring recoding.

MicroEJ is based on a Java Virtual Machine, a standard and mature virtual machine, deployed across billions of devices. This virtual processor abstracts

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the hardware constraints and removes the complexity of the Matrix of Pain and its infamous 500 million permutations. MicroEJ can handle “the pain” in about two to four weeks, without any impact on the existing software layer IP (typically in C language) which carries a significant portion of the system’s added-value.

Once it has been developed, the application can easily be ported onto other physical systems without further development. This flexibility results in obvious time and cost savings for the marketing of new products and services, along with tangible benefits for the declination of a brand identity.

Moreover, using MicroEJ, a marketing department can quickly prototype a product idea or service, evaluate the return on a test market before massively deploying the solution. Thanks to the versatility of MicroEJ’s internal virtual machine and a pool of more than 10 million Java developers worldwide, it is possible to develop not just one, but five or even ten prototypes simultaneously and choose the best one. Moreover the client knows that the chosen prototype will in essence be a very close match to the actual go-to-market product or service.

MicroEJ allows for a predictable Bill Of Materials

Freed from the complexity of the lower hardware layers and being able to focus on the added value of the application layers, designers still have another significant advantage with MicroEJ. Indeed the platform offers a PC-based simulator that allows for the inclusion/simulation of physical design elements.

This allows different hardware configurations to be tested more quickly, making it easy to answer important design questions such as: Should one select a \$5 microcontroller with a certain amount of memory or opt for the \$3 microcontroller with less memory? Which devices (sensors/actuators) should one choose? MicroEJ helps in providing reliable answers to these questions every time and thus facilitates tradeoff analysis for the best quality/cost ratio of the given technical solution. In addition to go-to-market acceleration, the platform improves the visibility on investment profitability. Much to the delight of any stakeholder carrying P&L responsibility, MicroEJ also helps in adjusting the needs for working capital on a given project.

By using MicroEJ, an automotive company claims a 15% reduction in (re)testing phases/validation and an overall 30% reduction in development time.

MicroEJ improves your Return on Investments

Not only does MicroEJ's flexibility accelerate product development, but during the prototyping phase, it allows for the training and communicating with the Sales and Distribution channels. Indeed, any company relying on MicroEJ can rapidly develop a working prototype whose applications (such as the graphical environment) will be identical as those of the finished product; this enables Sales to refine their pitch and distributors to be confident in having early dialogues with prospective and existing customers. This dynamic makes tremendous sense across the consumer electronics market and can also be leveraged in "industrial" electronics where, for example, the control panel of a tooling machine can easily be developed, prototyped, updated and tested with MicroEJ.

Achieving quantifiable results rapidly

Thanks to MicroEJ, a company can now deliver its product on time and on budget. The shared vision of the marketing and development teams results in rapid commercialization of the product, while minimizing the overall development time and risks.

There are mainly two possible paths when it comes to your design cycles: the boutique or homegrown traditional methods, where one risks spending countless cycles trying to reinvent the wheel, or a streamlined, automated development environment with MicroEJ facilitating the early validation and rapid prototyping phases.

Today, making a choice between using homegrown tools or buying off-the-shelf - COTS solutions (Make or Buy) has never been easier: anyone who wants to save time and money will choose MicroEJ (Buy) for its ease-of-use and rapidity in delivering a state-of-the-art product within time and budget.

Many customers have already seen a drastic reduction in development time. One large Asian consumer electronics company reports a development cycle of just 3-4 months with MicroEJ, compared to a whole year using traditional tools

and methods. By using MicroEJ, a major Defense contractor shaved 75% off the costs associated with the simulation & execution of their software. An automotive company claims a 15% reduction in (re)testing phases/validation and an overall 30% reduction in development time. The list goes on and amounts to several tens of millions of dollars in cumulated savings, thanks to the use of a readily available, safer and well-maintained development environment!

These hard financial metrics are also complemented by the fact that MicroEJ is a strong advocate for brand value. Indeed the portability of the applications help maintain the look-and-feel across several product lines, graphical interface, ergonomics and user experience, business logic and most importantly, the core IP of the brand.

CASE STUDY: HOME APPLIANCES MANUFACTURER

An appliances manufacturer wanted to equip its ranges, traditional and induction ovens with the latest touch screens. To improve the ergonomics of its devices along with its visual brand identity, the marketing director and his technical team were keen to offer their client an easy-to-use smartphone-type application. It was a good idea, but the public sale price of their devices would not allow for the pricey processor and the smartphone screen they had originally selected. However, they knew that with MicroEJ they could implement a solution just as attractive as that of a smartphone at a fraction of the cost.

In addition, the new user interface could be (re)utilized on future products even if they do not use the same hardware specification or electronic configuration. MicroEJ maintains the software layers independent of the hardware choices, minimizing the overall BOM.

CASE STUDY: SMART NETWORK OPERATOR

A Cable operator wanted to offer new services, such as a home alarm monitoring to its customers (in particular private residences), through its partners' ecosystem. In order to achieve this, two items needed to come together: (1) sensors on doors and windows, motion sensors, cameras, (which come from several suppliers), and (2) the existing fleet of "gateways" (or set-top-boxes - STBs). To launch such a service, the smart cable-operator could not change its entire park of gateway/STBs (its replacement rate hovers at around 10% per year).

However, within MicroEJ it was possible to simulate the new features and functionalities, and refine them within the MicroEJ contained development environment, before testing it on a panel of subscribers. The operator could then confidently decide to rollout the service on a large scale on all its existing gateways/STBs (via a software update). And thanks to the containment of MicroEJ, there was no risk of impacting the original services such as TV, VOD, and Internet...

This over-the-air add-on service on an existing bouquet is fast and safe, and its return on investment is immediate.

A NEW LIFE FOR MANY ELECTRONIC SYSTEMS

Although MicroEJ fits perfectly into the high-volume and cost-constrained electronic devices markets, it is also suitable for products with small and medium production runs. There is a large number of quality designs that fulfill their requirements perfectly, but do not have the connectivity, fancy smartphone-type touchscreens or automated over-the-air Maintenance Alert notification.

MicroEJ allows for the rejuvenation of these machines by complementing their existing IP, to make them more relevant in our interactive connected world, and possibly create new revenue streams with additional services in the Internet of Things (IOT) marketplace.

Once again, there is no need to spend large sums or suffer significant delays in developing a robust and updated solution. MicroEJ allows for quick design add-ons, while leveraging and protecting the existing IP.

MicroEJ: a large ecosystem of third-party power players

In response to market fragmentation, MicroEJ brings together a rich ecosystem of major players in the electronics and embedded marketplace, offering a unique and strong value proposition. The list of partners includes tools vendors, semiconductor manufacturers, board vendors, software stacks and libraries suppliers (graphics, operating systems, communication protocol...), and RTOS vendors. Some of these players include leading worldwide companies in their respective sectors such as STMicroelectronics, Freescale, Renesas, EOLANE, EBV, ARM/Keil, IAR, Micrium, GreenHills ... to name a few.

Multi-level value proposition

In Summary, MicroEJ is best fitted to:

- Run several market-ready design prototypes and validate early and often, assuring the alignment of the business plan with market reality (instead of relying heavily on market research)
- Easily adjust Bill of Materials' costs with the design components necessary to achieve a perfect product marketing mix in line with customer requirements
- Considerably reduce development risks and subsequently market timing issues, with early simulation, validation and rapid prototyping to facilitate delivering the product on time and on budget!
- Spend a lot less capital and operational funds in the design cycles, largely improving overall return over investment
- Strengthen and protect brand value and market recognition. Quickly and easily rejuvenate older products with modern add-ons while maintaining the strength of existing applications and user experiences across different hardware environments
- Greatly reduce the costs associated with the maintenance of old or obsolete designs.
- Master the complexity of the Internet of Things, and increase the added-value of its product lines through additional services
- Rely on large Java Development community versus the limited C-resources currently available worldwide



MicroEJ is a software vendor of cost-driven solutions for the smart digital world. MicroEJ is focused on providing turnkey software products to solve the embedded world's major business challenges and enable application-driven uses commensurate with the cost and resource constraints of the IoT world. MicroEJ helps OEMs create flexible devices, bring rich user experiences, and find additional sources of revenue across the whole value chain, from sensor data collection to cloud-based services.

Today, more than 1 million devices are powered by MicroEJ in industries such as home automation, consumer and wearables, communications, energy, transportation, healthcare, industrial automation, and smart building.

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