



# e2factory – Build Automation

The development of Linux-based systems for industry calls for efficient and evaluable processes for putting together the components, and for maintenance and updates. This necessitates standardized design and development processes, but also suitable tooling.

The origin of an embedded Linux system is often a cost-free board support package (BSP) from a chip or board manufacturer, or is a community distribution. To use these in one's own products they usually need to be adapted in terms of their range of functions, parameterization and configuration as well as the versions of individual packages.

## Flexible Configuration and Variant Management for BSPs

e2factory supports the unrestricted compilation, maintenance and updating of product-specific BSPs on the basis of mainline sources of a defined quality, using a bottom-up approach for their composition. It makes possible a validatable reproducibility of software states that is independent of either the build computer or particular people.

Furthermore, the multiply audited system supports secure location-independent development. At the same time,

it makes participation in innovations and continual security updates from the community manageable.

e2factory is professional open source software and is available free of charge under the GPLv3. As part of the e2factory professional package, emlix offers supplementary training, documentation and support. emlix uses its own tool validation, which is subject to continuous further development.

## Features and Benefits

e2factory has been continuously updated and developed since 2003 and has been used in hundreds of development projects as well as for maintenance and for platform strategies. It offers the following features and additional benefits:

- Simple and transparent to use
- Low complexity with focused functionality
- Clear separation of build system, sources and configurations
- Bottom-up approach to system design
- Reliable build automation management
- Auditable software change management
- Reproducibility of all software stages via check sum
- Multi-user capability through client/server architecture
- Community-near working methods (mainline compliance)
- Process security combined with build-computer and person independence

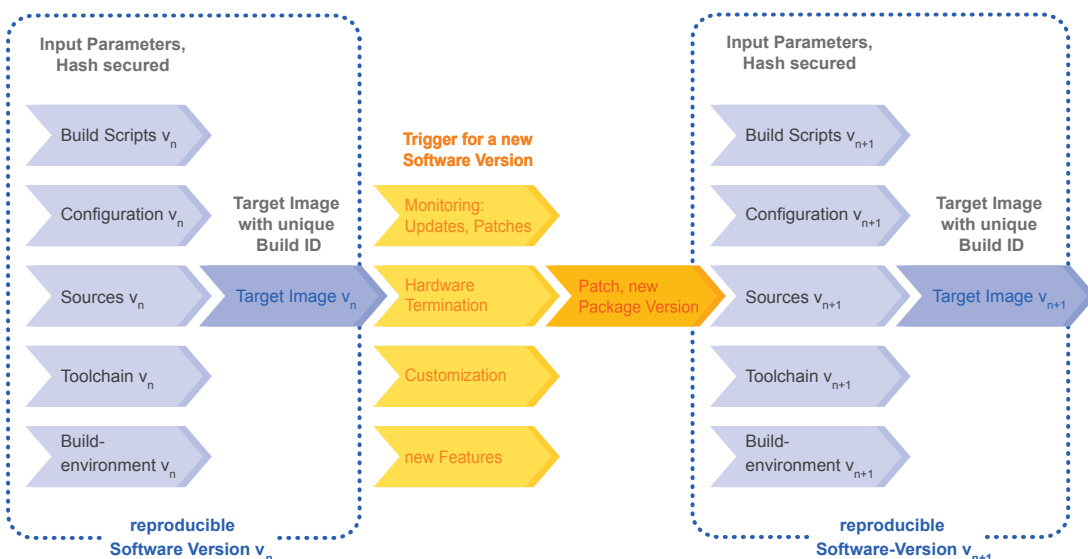


Fig 1: e2factory provides reliable version and variant management. Even years later, the desired releases can be accurately reconstructed and modified independently of the build computer. The process behind this fulfils diverse certification requirements

- Secure distributed work across locations (e2factory workbench)
- Direct integration into continuous integration systems (CI)
- Backwards compatibility and validatability
- Efficient and reliable life cycle management
- Comprehensive documentation

In contrast to distributions, individual software stages throughout the life cycle can be comprehended in detail, documented and reproduced validatably. Furthermore, kernel versions, updated drivers and patches from hardware manufacturers can be integrated easily.

e2factory-based BSPs von emlix have successfully achieved certification from the FDA and the PTB, among others. Development processes according to IEC 62304 for medical products are supported consistently.

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## BitBake Poky-tiny Yocto

Using the minimal distribution Poky-Tiny as a foundation, emlix offers a bottom-up approach for putting together embedded Linux systems on the basis of Yocto. Instead of e2factory, the Yocto build system BitBake is used. Starting with Poky-Tiny, the software packages needed for the product are (ideally) taken directly from the upstream (mainline) sources and integrated.

This approach combines the advantages of a bottom-up approach to the compilation of BSPs with the familiarity of the Yocto distribution, especially with regard to application developers.

## BSPs: Strategic planning

The well-thought-out and strategic selection of build system, toolchain, kernel, drivers, software packages and test system is a decisive factor in the long-term viability of Linux-based industrial products. Licence management, maintenance and security monitoring are further areas where strategic decisions need to be made in the context of system design.

As a result of this, a cross-product platform strategy with the following aims is defined:

- More efficient work through standardized software modules, unified tooling and automated release builds
- Improved ability to react to changes in the component market and efficient, low-risk adaptations
- Independence from product and release policies via the software selection and range of functions of community-based distributions
- Security in relation to contract partners and certifying authorities regarding declarations about origin, adaptations and licensing of the software
- Secure reproducibility of all relevant versions over the entire product life cycle

## e2factory workbench

For the support of seamless cooperation between developer groups emlix offers the e2factory workbench. It supports the development of board support packages and applications distributed across locations and companies, and offers the necessary processes for long-term product maintenance.

Using e2factory workbench emlix hosts the projects of its customers within the emlix infrastructure (certified computing centres, backup and recovery). Defined users can access the workbench via encrypted connections and work together within a development cooperation worldwide, independent of their location.