

# Model Driven Embedded Systems

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We are now at a stage in the development of embedded systems where the complexity of the software development and the software itself needs to be managed not via code but via models. This move to a more abstract representation of the system brings many new challenges to primarily the methodology and the style of system development.

The Object Management Group's (OMG) Model Driven Architecture<sup>1</sup> (MDA) is an initiative towards fully model based software development. However, while the MDA is aimed at large-scale, enterprise applications, it is also going to be used with embedded development and need to take into consideration the constraints that are not apparent or irrelevant larger systems [2].

The advantages of taking a (or even *the*) model driven approach is that we can abstract from the system at many levels and take advantage of well known "large scale software" techniques such as automatic code generation, production line techniques etc [1, 4] as well as the concept of model compilation to transform one model into another.

The most interesting point however of a model driven approach is the ability to continuously map the model from a platform independent model to (a) more platform specific model(s) through model transformations. This may be performed either *vertically* meaning here development of the model or horizontally meaning mapping the model to a different (or supporting) modeling aspect, eg: structural to timing [3]. This means that the key issue in the future will be the form and function of the model transformations and which transformations are applied at which stages of system development.

The ability to integrate different models and series of models we can apply more formal techniques such as refinement to ensure that the models are remaining consistent to higher-level requirements. With the wealth of information available in models, we have the ability to tailor precisely the mappings from one abstraction level to a more concrete level. For example, generated code will more respect the models rather than just the structural properties.

## References

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<sup>1</sup>[www.omg.org/mda](http://www.omg.org/mda)