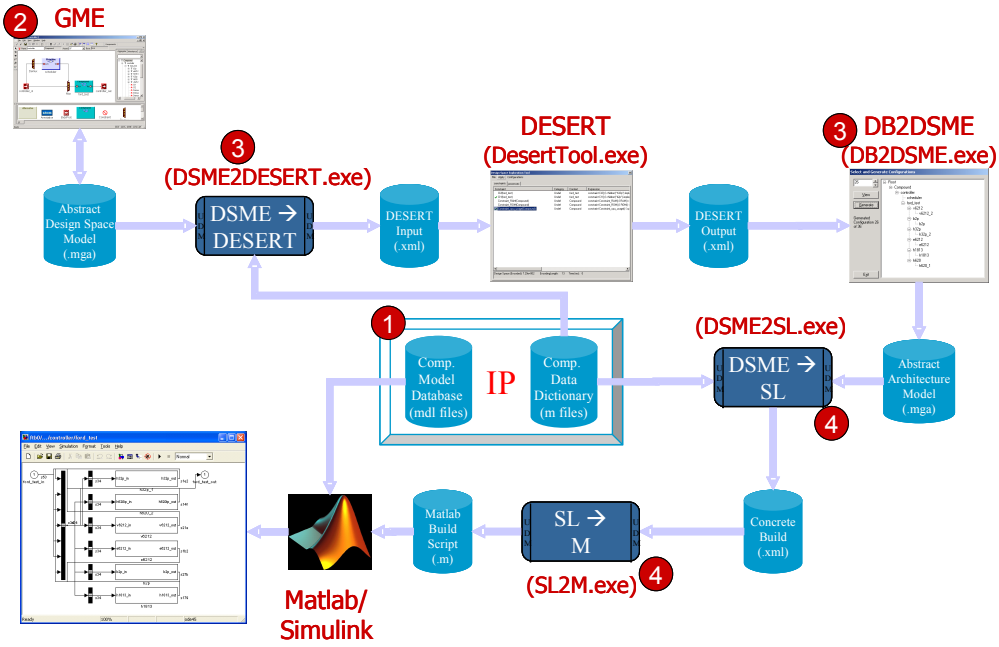
# DESERT: A Meta-Programmable Tool for Constraint-based Pruning and Exploration of Large Design Spaces[1]
# Summary of Features

DESERT is a meta-programmable tool for navigation and pruning of large design spaces using constraints. It provides a generic structured representation of design-spaces based on the concept of alternatives and parameters. DESERT has been used to represent design spaces in a rich variety of problem domains – product-line architectures, hardware-software co-design, automated model-compilation among others. An expressive constraint language based on a subset of OCL allows expression of compositional, resources, and performance (time, energy, size, weight, cost) constraints. Internally, DESERT employs a powerful and highly scalable symbolic representation based on Ordered Binary Decision Diagrams, that allows for rapid, and efficient manipulation of very large design spaces with constraints. In order to solve constraints that involve complex mathematical operations, DESERT interfaces with Mozart, a powerful environment for constraint logic programming based on the Oz constraint language. An XML based input and output interfaces accompanied with a programmatic API, allows easy and semantically correct integration of DESERT with custom Domain-Specific Modeling Languages.

A tool-chain implementing an Automated Model Compiler, utilizing DESERT is illustrated below:




**Automated Model Compiler based on DESERT**

1. Matlab/Simulink and Component Repository: The repository contains simulation model for various automotive subsystems.
2. Design-Space Modeling Environment (GME): Design space models capture the hierarchical composition of vehicle systems and capture design alternatives for subsystems.
3. Design-Space Abstraction (DSME2DESERT and DB2DSME): DESERT uses a domain-independent meta-model, which separates its internal algorithms from domain-specific constructs. The Design-Space Abstraction component of the AMC tool-chain provides two-way model translation between the Design-Space Models and the DESERT's abstract design-space models.
4. De-abstraction and Assembly (DSME2SL and SL2M): This component of the AMC tool-chain elaborates the abstract high-level architectural model with Simulink model details and constructs the assembly model.

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