Task Description for
  Bachelor Thesis
  Minor Thesis (Großer Beleg)
  Master Thesis
  Final Thesis (Diplomarbeit)

Thesis title:	**Design and Implementation of a Graceful Degradation Approach of Role Function Invocation in Object Teams Java**
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Role-oriented programming will be a key concept in realizing future complex, adaptive software systems. Therefore, the object-oriented paradigm is extended with roles. Objects can play and remove roles at runtime. Playing a role changes the type of objects and may add or change attributes and methods to the object. Moreover, roles describe dynamic relationships between other objects

Object Teams Java is a programming language extending syntax and semantics of Java implemented as an extension of the production-grade Eclipse Java compiler. The language supports dynamic extension of objects at runtime inspired by aspect-oriented concepts such as adaptations executing before, after, or replacing original functions. The dynamic nature of those adaptations make premature optimizations impossible and require performance optimizations taking place at runtime.

Function calls are one class of instructions exhibiting lots of performance improvement potential. While recent research increased the efficiency of discovery and linking of call sites for role invocation there is still room for improvement. While performance increases as long as linked call sites can be reused a graceful degradation mechanism is required if call sites need to be relinked due to invalidation.

The task of this thesis is to develop an approach that can leverage latest results on increasing the performance of role invocation while incorporating a graceful degradation approach reverting to a dynamically more efficient variant whenever call sites are unstable due to subsequent invalidation. Therefore, the student has to design and implement his concept in the Object Teams Java compiler, runtime compiler, and runtime. An evaluation of the resulting architecture has to be performed.