

# Abstract

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Mobile computing poses different requirements on middleware than more traditional desktop systems interconnected by fixed networks. Not only the characteristics of mobile network technologies as for example lower bandwidth and unreliability demand for customized support. Moreover, the devices employed in mobile settings usually are less powerful than their desktop counterparts. Slow processors, a fairly limited amount of memory, and smaller displays are typical properties of mobile equipment, again requiring special treatment. Furthermore, user mobility results in additional requirements on appropriate middleware support. As opposed to the quite static environments dominating the world of desktop computing, dynamic aspects gain more importance. Suitable strategies and techniques for exploring the environment e.g. in order to discover services available locally are only one example. Managing resources in a fault-tolerant manner, reducing the impact ill-behaved clients have on system stability define yet another exemplary prerequisite.

Most state of the art middleware has been designed for use in the realm of static, resource rich environments and hence is not immediately applicable in mobile settings as set forth above. The work described throughout this thesis aims at investigating the suitability of different middleware technologies with regard to application design, development, and deployment in the context of mobile networks. Mostly based upon prototypes, shortcomings of those technologies are identified and possible solutions are proposed and evaluated where appropriate.

Besides tailoring middleware to specific communication and device characteristics, the cellular structure of current mobile networks may and shall be exploited in favor of more scalable and robust systems. Hence, an additional topic considered within this thesis is to point out and investigate suitable approaches permitting to benefit from such cellular infrastructures. In particular, a system architecture for the development of applications in the context of mobile networks will be proposed. An evaluation of this architecture employing mobile agents as flexible, network-side representatives for mobile terminals is performed, again based upon a prototype application.

In summary, this thesis aims at providing several complementary approaches regarding middleware support tailored for mobile, cellular networks, a field considered to be of rising importance in a world where mobile communication and particularly data services emerge rapidly, augmenting the globally interconnecting, wired Internet.