



Doctoral Thesis

## From file pathnames to file objects

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# **From File Pathnames To File Objects**

## **An Approach to extending File System Functionality integrating Object-Oriented Database System Concepts**

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# Abstract

User interaction with computers is centred on the file system and most user information is organised, retrieved, managed and shared via the file system. Users access that data by specifying a location within the file system structure. While the last two decades have seen major changes in terms of tools to visualise and navigate the file system, the fundamental concepts and abstraction level of the file system in terms of structure and purpose have remained unchanged. Basically, file systems are single-user, single-location, single-structure and consider files under the original notion of physical storage (*file = pathname*) rather than logical. Mechanisms for sharing and moving files are built on top of the file system layer and, in many cases, are still primitive and cumbersome from the point of view of the user. Furthermore, although files are often closely associated, the file system manages them as single information units. The need for an evolutionary change is real and comes from the developers as well as from the users, especially the expert ones.

Research projects have already investigated the possibilities for extending the initial definition of a file. In some cases novel approaches were introduced, but most of them were just *forerunners* and started too early compared with the existing technology. In many other cases the extended architectures introduced were simply a re-doing of old approaches, with a new look, without relevant improvements. We believe that certain key concepts such as persistence, distribution and multi-user support need to be in-built at the core of the system. In this way, new generation file systems can assist a rapid development of new applications because relevant functionality would already be available in the form of an API at the operating system level, freeing software developers from the obligation of providing self-made solutions.

Our research produced a new concept of document system based on an object-oriented model of shared connected document space. OMX-FS is the implementation of an extended file system to validate the concept. We