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Towards a Generic Model for Peer-to-Peer Systems

**By
Mohamed Ahmed Maher Ibrahim**

**A Thesis Submitted to the
Faculty of Computers and Information
Cairo University**

**In Partial Fulfillment of the Requirements for the Degree of
Master of Science in Computer Science**

**Under the Supervision of
Prof. Dr. Reem Bahgat
Head of Computer Science Department**

**Faculty of Computers and Information
Cairo University - Egypt
July / 2005**

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Statement

I certify that this work has not been accepted in substance for any academic degree and is not currently being submitted in candidature for any other degree.

Student Name : Mohamed Ahmed Maher Ibrahim

Signature : *Mohamed Maher*

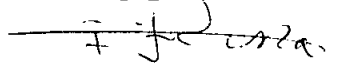
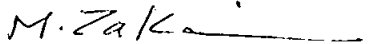
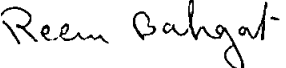
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Approved by
Examine Committee

		<u>Signature</u>
Prof. Dr. / Ibrahim Farag Essa,	(Member)	
Prof. Dr. / Mohamed Zaki Abdel Maguid, (Member)		
Prof. Dr. / Reem Mohamed Reda Bahgat, (Thesis Main Advisor)		

Faculty of Computers and Information
Cairo University - Egypt
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Abstract

Peer-to-Peer (P2P) approach is attracting new researchers and developers with its increasing number of the currently developed systems. Researchers try to use the P2P approach and architecture to tackle kinds of problem that require an increased amount of resources or that will take a lot of time for the required computation power. Handling the existing resource consumption problems changed by returning back to P2P model, where interconnected peers over the connected networks and the Internet share their idle resources and services to the other peers across the connected network. Different non-homogeneous systems are developed each time with new networks protocols to provide services and resources to the network. These systems with their heterogeneous types of services and resources made a gap in the P2P networks where each Peer in one system is isolated from the other peers that are not connected to the same network. The interoperability between the peers is missing since the protocols used to connect to a network are only restricted to this network. Services that are provided in one network cannot be obtained by another peer from another network because of the lack of intercommunication and the lack of a common language or protocol that can describe the shared services or that can provide information about the shared resources.

In this thesis we try to solve the problem of interoperability between P2P systems. We try to provide peers with the solution to make them capable to intercommunicate with each other through using generic customizable messages and resource description format. The new messaging and description formats, Peers XML Messaging Layer (PXML) and PXML Resource Description (PXML-RD), use XML as the definition formats to be independent from programming languages, operating systems and even the peer running-on device. PXML defines a customizable schema that can cover different types of required formats related to the peer's service providers. It is used for making the intercommunication between different peers. The PXML format itself does not define a set of limited protocols like other solutions do, but can be used to define any protocol using the generic element format that was chosen for the P2P requirements.

PXML-RD, on the other hand, deals with the uses of various types of shared resources in P2P systems and their need to be well described to be able to discover them. The lack of agreed-on standard format for describing these resources in the growing P2P networks, make us propose a generic, extendible and suitable format for working with these various resources shared by dissimilar types of peers. We propose PXML-RD as a generic metadata resource description format that can be used alone or as an interchangeable metadata description between P2P networks.

We use PXML and PXML-RD, to propose a generic architectural model to provide integrated P2P-enabled facilities of shared services and resources. They can be used to provide application with the required P2P connection methods since they can integrate different types of networks. Through a layered architecture message passing model, they transparently separate the connected service from the P2P connection networks. They provide a more flexible solution to integrate more types of services, applications, and P2P networks; and to provide overlaid application that uses new customized PXML protocols to build and use the underlaid services.