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**REQUIREMENT-BASED POLICIES
FOR
ELECTRONIC MESSAGE DISTRIBUTION**

**BY
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**A thesis submitted to the University of Moratuwa
in partial fulfillment of the requirements
for the Degree of Master of Philosophy**



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DECLARATION

This thesis is a report of research work carried out in the Department of Computer Science and Engineering, University of Moratuwa, between March 1995 and March 2000.

Except where references are made to the other work, the content of the thesis is original and includes nothing which is the outcome of work done in collaboration. The work has not been submitted in part or in whole to any other university.

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ABSTRACT

Many parts of the world endeavour to extend access to more individuals and institutions by means of the electronic messaging system in the ever-evolving Internet. While that messaging system is continuing to incorporate more and more features such as multi-media information, technical barriers in many parts of the world or uncontrolled behaviours of originators hinder such expansion. It is the lack of user-requirement based policies in the messaging system that increases the constraints to such environments. At the same time the need to integrate and coordinate other messaging systems such as fax, paging, postal mail etc. with the Internet messaging system still exists. On the other hand whether constrained or not, users wish to administer their retrieval of messages in particular manners such as blocking unwanted messages, using alternate message delivery media, using strategic message delivery methods especially for lengthy messages, etc., which in turn leads to a formation of requirement-based policies of the messaging system.

Currently there are standards governing message handling, in particular MIME (Multipurpose Internet Mail Extensions), for exchanging mail messages encompassing a multitude of media, such as graphics images, voice, data and full motion video apart from plain text. However, the MIME standard presupposes certain minimum technical capabilities amongst interconnected and participating mailservers and nodes for distribution of such multimedia mail. In particular, the interconnecting channels between mailservers should be of sufficient bandwidth to conduct the large amount of data in MIME messages at 'reasonable' rates and also the nodes must have adequate storage capacity for the same. This requirement for bandwidth of channels and storage of mailservers for MIME capability prevents users connected to 'under-privileged' mail nodes from enjoying the benefits brought about by multi-media information and messaging. This may be in spite of the end users owning or having access to resource rich machines.

On the other hand, with the introduction of MIME capabilities, users are faced with the essential requirement of administration at the server side owing to the fact that the availability of many media types would impose increased abuses, intended or accidental, especially in the face of new inventions of media types.

As a strategic solution to this phenomenon, the concept of an adaptive, service-oriented mail server employing a smart approach to routing of multi-media messages in an internetwork of mailservers, disparate in storage capacity, performance, network bandwidth and administration, is presented. This concept, described as Hierarchical Actions Transfer (HAT) concept, involves offsetting the bandwidth and capacity limitations or “desires” of a node at a specific level by requesting a mail node a step higher up to oblige to perform services on its behalf (which the former node is incapable of performing or not willing to, due to capacity or bandwidth limitations or self imposed restrictions).

The service requests that are in line with the Requirement-Based Policies are known to the server through a specific configuration mechanism. When delivering messages, the server will first look at the configuration of each connected node and then the message delivery will take place accordingly. It would be inevitably a service-oriented strategy to relieve nodes in constrained environments.



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An added advantage of the approach is that it implements administrative policies for controlling traffic and congestion arising from MIME mail to a mailserver site and the level of MIME services made available to users connected to that site. Further, the technique also integrates conventional and primitive messaging mechanisms, such as postal mail, courier by diskettes/tapes, facsimile and paging, into the realm of electronic messaging.

It could be further enhanced by the incorporation of Artificial Intelligence if it could identify patterns of frequent node requests. However, current implementation that uses “sendmail” as the Message Transfer Agent (MTA) focuses only on the manual and semi-automatic configuration of such services.

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To

my wife Achala

daughter Anarga



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my parents

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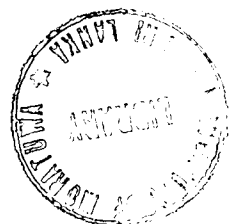
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ABBREVIATIONS

| | |
|------|--|
| MIME | Multi-purpose Internet Mail Extensions |
| MUA | Message User Agent |
| MTA | Message Transfer Agent |
| RFC | Request for Comments |
| IETF | Internet Engineering Task Force |
| HAT | Hierarchical Actions Transfer |
| BNF | Backus-Naur Form |
| MHS | Message Handling System |
| OSI | Open Systems Architecture |
| SMTP | Simple mail Transfer Protocol |
| UUCP | Unix to Unix Copy Protocol |
| POP | Post Office Protocol |
| SGML | Standard Generalized Markup Language |



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