

Network Working Group
Internet-Draft
Intended Status: Proposed Standard

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December 15, 2008

The IMAP SEARCH=INTHREAD and THREAD=REFS Extensions
draft-gulbrandsen-imap-inthread-05.txt

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Abstract

The SEARCH=INTHREAD extension extends the IMAP SEARCH command to operate on threads as well as individual messages. Other commands which search are implicitly extended.

The THREAD=REFS extension provides a threading algorithm using (almost) only the References header field for use with the IMAP THREAD command.

1. Conventions Used in This Document

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [[RFC2119](#)].

Formal syntax is defined by [[RFC5234](#)].

Example lines prefaced by "C:" are sent by the client and ones prefaced by "S:" by the server. The five characters [...] means that something has been elided.

2. Overview

This document defines two related extensions.

The THREAD=REFS extension defined a fairly pure References-based (see [[RFC5322](#)] [section 3.6.4](#)) threading algorithm for use with the THREAD command (see [[RFC5256](#)]) and with SEARCH=INTHREAD.

An IMAP server (see [[RFC3501](#)]) that supports the THREAD=REFS extension MUST announce THREAD=REFS as capabilities. This extension adds no new commands and responses, only a new thread algorithm.

The SEARCH=INTHREAD extension extends the IMAP SEARCH command to operate on threads as well as individual messages. Other commands which search are implicitly extended. SEARCH=INTHREAD requires that servers implement THREAD=REFS too.

An IMAP server that supports SEARCH=INTHREAD MUST announce both SEARCH=INTHREAD and THREAD=REFS as capabilities. This extension adds

no new commands and responses, but adds four new search-keys, INTHREAD, THREADROOT, THREADLEAF and MESSAGEID, and least one search return option, THREAD=REFS.

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[3.](#) New Search Keys

This document defines three new search keys which operate on threads: One to find all messages in a thread where at least one message matches another search key, one to find the roots of threads and one to find the leaves. It also defines a helper which matches a message given its message-id.

[3.1.](#) The INTHREAD Search Key

INTHREAD takes one argument, which is another search key.

The INTHREAD search-key matches a message if its subsidiary search-key matches at least one message in the same thread as the message.

This command finds all messages in an entire thread concerning the meetings where fizzles were discussed:

```
C: a UID SEARCH INTHREAD (SUBJECT meeting BODY fizzle)
```

This command finds all threads containing at least one message from fred@example.com:

```
C: a UID THREAD REFS utf-8 INTHREAD FROM <fred@example.com>
```

[3.2.](#) The THREADROOT Search Key

The THREADROOT search key matches a message if that message does not have any parent message in the same mailbox according to the active threading algorithm (see [section 3.5](#)).

This command finds the roots of all threads containing unread messages:

C: a UID SEARCH THREADROOT INTHREAD UNSEEN

[3.3.](#) The THREADLEAF Search Key

The THREADLEAF search key matches a message if that message has no child message in the same mailbox, according to the active threading algorithm.

Note that THEADLEAF interacts badly with THREAD=ORDEREDSUBJECT. THREAD=ORDEREDSUBJECT is defined such that every message is either a root or a leaf, there are no intermediate nodes.

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This command finds all messages that were (also) sent to me, and to which noone has answered:

```
C: a UID SEARCH THREADLEAF OR TO <me@example.com> CC
    <me@example.com>
```

[3.4.](#) The MESSAGEID Search Key

The MESSAGEID search key takes a sigle argument, and matches a message if that message's normalized nessage-id is the same as the argument.

This command finds all in the same thread as
<4321.1234321@example.com>:

```
C: a UID SEARCH INTHREAD MESSAGEID <4321.1234321@example.com>
```

[3.5.](#) The THREAD=* Search Return Option(s)

The THREAD=* search return options enables the client to select which threading algorithm the server uses when processing INTHREAD, THREADROOT and THREADLEAF as part of a SEARCH command. If THREAD=* isn't specified, then the default for the SEARCH command is THREAD=REFS.

When the server processes a THREAD command, it uses the algorithm specified by the client.

This command sorts the messages by subject and returns the first message with each subject, disregarding "fwd", "re" and other paraphernalia:

C: a UID SEARCH RETURN (THREAD=ORDEREDSUBJECT) THREADROOT

[4.](#) The THREAD=REFS Thread Algorithm

The THREAD=REFS thread algorithm is defined as the part of THREAD=REFERENCES (see [[RFC5256](#)]) which concerns itself with the References, In-Reply-To and Message-ID fields. It has the following three differences from THREAD=REFERENCES:

THREAD=REFS ignores Subject. Where THREAD=REFERENCES groups independent threads into one thread when they have same subject field (such as "Agenda for Friday's meeting", "Web site updated" or "Message delivery failed"), THREAD=REFS keeps them apart.

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THREAD=REFS sorts by the most recent date in each thread, replacing step (4) of THREAD=REFERENCES. This means that when a new message arrives, its thread becomes the latest thread. A message's date is computed as specified in [[RFC5256](#)] [section 2.2](#).

It is explicitly permitted for the server to persistently store threading information, even if this causes the server to return different information than it would otherwise. This can happen if the first messages in a thread are deleted, for example.

[5.](#) Formal Syntax

The following syntax specification uses the Augmented Backus-Naur Form (ABNF) notation as specified in [[RFC5234](#)]. [[RFC3501](#)] defines the non-terminals "capability" and "search-key", [[RFC4466](#)] defines "search-return-opt", [[RFC5256](#)] defines "thread-alg", and [[RFC5322](#)] defines "id-left" and "id-right".

Except as noted otherwise, all alphabetic characters are case-insensitive. The use of upper or lower case characters to define token strings is for editorial clarity only. Implementations MUST

accept these strings in a case-insensitive fashion.

capability =/ "SEARCH=INTHREAD" / "THREAD=REFS"

search-key =/ "INTHREAD" SP search-key / "MESSAGEID" SP "<"
 id-left "@" id-right ">" / "THREADROOT" /
 "THREADLEAF"

thread-alg =/ "REFS"

search-return-opt =/ "THREAD=" thread-alg

[6.](#) Security Considerations

This document is believed not to have any security implications.

[7.](#) IANA Considerations

The IANA is requested to add SEARCH=INTHREAD and THREAD=REFS to the list of IMAP extensions,
<http://www.iana.org/assignments/imap4-capabilities>.

[8.](#) Acknowledgements

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The name THREAD=REFS was suggested by Cyrus Daboo. Dave Cridland, Alexey Menikov and particularly Timo Sirainen have helped with the document.

[9.](#) Normative References

- [RFC2119] Bradner, "Key words for use in RFCs to Indicate Requirement Levels", [RFC 2119](#), Harvard University, March 1997.
- [RFC3501] Crispin, "Internet Message Access Protocol - Version 4rev1", [RFC 3501](#), University of Washington, June 2003.
- [RFC4466] Melnikov, Daboo, "Collected Extensions to IMAP4 ABNF",

[RFC 4466](#), Isode Ltd., April 2006.

- [RFC5234] Crocker, D. and P. Overell, "Augmented BNF for Syntax Specifications: ABNF", [RFC 5234](#), January 2008.
- [RFC5256] Crispin, Murchison, "INTERNET MESSAGE ACCESS PROTOCOL - SORT AND THREAD EXTENSIONS", [RFC 5256](#), Panda Programming, June 2008.
- [RFC5322] Resnick, "Internet Message Format", [RFC 5322](#), Qualcomm, October 2008.

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(RFC Editor: Please delete everything after this point)

Open Issues

None.

Changes since -00

- The IANA asked me to specify the IANA registry exactly
- Boilerplate updates - IETF Trust and so on.

Changes since -01

- Added THREADROOT, THREADLEAF and MESSAGEID
- Fixed the typo

Changes since -02

- Specified thread algorithm per-command, generally using a search return option.
- Defined THREADROOT and THREADLEAF robustly.
- Required that the server implement THREAD=REFS if it implements SEARCH=INTHREAD.
- Use In-Reply-To as THREAD=REFERENCES, since Timo prefers that and I don't mind.
- Use Date as T=R does. Hm? Good idea?

Changes since -03

- Boilerplate updates for 5377 and blah

Changes since -04

- Sort threads by the most recent date in each thread, so that new messages arriving makes a thread new again.

- Generally rephrase the T=R section, so that the requirements line

up textually

- Avoid the word extant. It's too odd, using it is begging for a misunderstanding.