How NTFS reserves space for its Master File Table (MFT)

Support for Windows XP has ended

Microsoft ended support for Windows XP on April 8, 2014. This change has affected your software updates and security options. Learn what this means for you and how to stay protected.

Article ID: 174619 - View products that this article applies to.

System Tip

This article applies to a different version of Windows than

than the one you are using. Content in this article may not be relevant to you.

This article was previously published under Q174619

The NTFS file system contains at its core, a file called the master file table (MFT). There is at least one entry in the MFT for every file on an NTFS volume, including the MFT itself.

Because utilities that

defragment
NTFS
volumes
cannot
move
MFT
entries,
and

because
excessive
fragmentation
of
the
MFT
can
impact
performance,
NTFS
reserves
space
for
the
MFT
in
an
effort
to
keep
the
MFT
as
contiguous
as
possible
as
it
grows.

Change in Windows XP and in Windows Server 2003

In
Windows
XP
and
in
Windows
Server
2003,

the
defrag
utility
defrags
the
MFT.

A
defrag
operation
on
the
MFT
combines

an
MFT
file
into
1
and
prevents
it
from
being
stored
in
multiple
places
that
are
not
sequential
on
disk.
In
this
class
of
operation,
the
MFT
file
is
more
sequential.
However,
it
is
exactly
the
size
that
the

MFT
file
was
before
the
defrag
operation.

An
MFT
can
be
too
big
if
a
volume
used
to
have
lots
of
files
that
were
deleted.
The
files
that
were
deleted
cause
internal
holes
in
the
MFT.

These
holes
are
significant
regions
that
are
unused
by
files.
It
is
impossible
to
reclaim
this

space.
This
is
at
least
true
on
a
live
NTFS
volume.

NTFS
uses
MFT
entries
to
define
the
files
to
which
they
correspond.
All
information
about
a
file,
including
its
size,
time
and
date
stamps,
permissions,
and
data
content
is
either
stored
in
MFT
entries
or
in
space
external
to
the
MFT
but
described
by
the

the
MFT
entries.

(Directory
entries,
external
to
the
MFT,
also
contain
some
redundant
information
regarding
files.
But
a
full
discussion
of
all
the
structures
on
NTFS
is
beyond
the
scope
of
this
article.)

As
files
are
added
to
an
NTFS
volume,
more
entries
are
added
to

the
MFT
and
so
the
MFT
increases
in
size.
When
files
are
deleted
from
an
NTFS
volume,
their
MFT
entries
are
marked
as
free
and
may
be
reused,

but
the
MFT
does
not
shrink.
Thus,
space
used
by
these
entries
is
not
reclaimed
from
the
disk.

Because
of
the
importance
of
the

MFT
to
NTFS
and
the
possible
impact
on
performance
if
this
file
becomes
highly
fragmented,
NTFS
makes
a
special
effort
to
keep
this
file
contiguous.
NTFS
reserves
12.5
percent
of
the
volume
for
exclusive
use
of
the
MFT
until
and
unless
the
remainder
of
the
volume
is
completely
used
up.
Thus,

space
for

files
and
directories
is
not
allocated
from
this
MFT
zone
until
all
other
space
is
allocated
first.

Note
You
can
change
the
NtfsMFTZoneReservation
registry
key
to
increase
the
volume
in
Windows
NT
4.0
Service
Pack
4.

For
more
information
about
the
MFT,
please
see
the
"Key
elements
in
the
disk
defragmentation

process"
section
of
the
following
Microsoft
Technet
Web
site:
http://technet.microsoft.com/en-
us/library/bb742585.aspx
(http://technet.microsoft.com/en-
us/library/bb742585.aspx)

Depending
on
the
average
file
size
and

and
other
variables,
either
the
reserved
MFT
zone
or
the
unreserved
space
on
the
disk
may
be
used
up
before
the
other
as
the
disk
fills
to
capacity.

Volumes
with
a
small
number

of
relatively
large
files
exhaust
the
unreserved
space
first,
while
volumes
with
a
large
number
of
relatively
small
files
exhaust
the
MFT
zone
space
first.
In
either
case,
fragmentation
of
the
MFT
starts
to
take
place
when
one
region
or
the
other

becomes
full.
If
the
unreserved
space
becomes
full,
space
for
user

files
and
directories
starts
to
be
allocated
from
the
MFT
zone
competing
with
the
MFT
for
allocation.
If
the
MFT
zone
becomes
full,
space
for
new
MFT
entries
is
allocated
from
the
remainder
of
the
disk,
again
competing
with
other
files.

A
new
registry
parameter
was
introduced
in
Service
Pack
4
for

Windows
NT
4.0
that
can
increase
the
percentage
of
a
volume

that
NTFS
reserves
for
its
master
file
table.
NtfsMftZoneReservation
is
a
REG_DWORD
value
that
can
take
on
a
value
between
1
and
4,
where
1
corresponds
to
the
minimum
MFT
zone
size
and
4
corresponds
to
the
maximum.
If
the
parameter
is

not
specified
or
an
invalid
value
is
supplied,
NTFS
uses
a
default
value
of
1
for
this
parameter.
The
exact
ratios
that
correspond
to
each
setting
are
undocumented
because
they
are
not
standardized
and

may
change
in
future
releases.
In
order
to
know
what
setting
is
best
for
your
environment,
it
may
be

necessary
to
experiment
with
different
values.

To
determine
the
current
size
of
the
MFT
on
a
Windows
NT-
based
computer,
type
the
dir
/a
$mft
command
on
an
NTFS
volume.

To
determine
the
current
size
of
the
MFT
on
a
Microsoft
Windows
2000-
based
computer,
use
Disk
Defragmenter
to
analyze
the

NTFS
drive,
and

and
then
click
**View
Report**
This
displays
the
drive
statistics,
including
the
current
MFT
size
and
number
of
fragments.

The
Windows
2000
version
of
Disk
Defragmenter
displays
"green"
for
what
is
called
"system
files"
and
on
an
NTFS
formatted
volume
this
is
simply
the
combination
of
the
MFT,
pagefile.sys
(if

one
exists
on
this
volume)
and
what
is
called
the
"MFT
Zone"
or
reserved
space
for
"MFT
Expansion".
The
defragmentation
report
only
displays
information
about

the
pagefile
and
MFT;
it
does
not
mention
the
MFT
Zone
because
it
does
not
effect
in
any
way
disk
utilization
or
capacity.

The
MFT
Zone
is

not
subtracted
from
available
(free)
drive
space
used
for
user
data
files,
it
is
only
space
that
is
used
last.
When
the
MFT
needs
to
increase
in
size,
for
example,
you
created
new
files
and
directories,
it
is
taken
from
the
MFT
Zone
first,
thus
decreasing
MFT
fragmentation

and
optimizing
MFT
performance.

The
default
MFT
Zone
is
calculated
and
reserved
by
Ntfs.sys
when
it
mounts
the
volume,
and
is
based
on
volume
size.
You
can
increase
the
MFT
Zone
by
means
of
the
registry
entry
documented
below,
but
you
cannot
make
the
default
MFT
Zone
smaller
than
what
is
calculated
by
Ntfs.sys.
Increasing
the
MFT

Zone
does
not
decrease
in
any
way
disk
space
that
can
be
used
by
users
for
data

files.

Note
The results returned by the **dir** command may not be current. The size reported by the **dir** command may reflect cached data that reflects the size of the MFT at the time the

system was started following an orderly shutdown.

Important
This section, method, or task contains steps that tell you how to modify the registry. However, serious problems might occur if you modify the registry incorrectly. Therefore, make sure that you

you follow these steps carefully. For added protection, back up the registry before you

modify it. Then, you can restore the registry if a problem occurs. For more information about how to back up and restore the registry, click the following article number to view the article in the Microsoft Knowledge Base:

322756 (http://support.microsoft.com/kb/322756/) How to back up and restore the registry in Windows

To add this value, perform the following steps:

1. Run Registry Editor (Regedt32.exe), and go to the following subkey:

   HKEY_LOCAL_MACHINE\System\CurrentControlSet\Control\FileSystem

2. From the **Edit** menu, click **Add Value**.

3. Type the following information in the dialog box:

   Value Name: NtfsMftZoneReservation

   Data Type: REG_DWORD

   Data: (valid range is 1-4)

4. Quit **Registry Editor** and restart your computer.

Note

This is a run-time parameter and does not affect the actual format of a volume. Rather, it affects the way NTFS allocates space on all

volumes
on
a
given
system.
Therefore,
to
be
completely
effective,
the
parameter
must
be
in
effect
from
the
time
that
a
volume
is
formatted
and
throughout
the
life
of
the
volume.
If
the
registry
parameter
is
adjusted
downward
or
removed,
the
MFT
zone
will
be
reduced
accordingly,
but
this
will
not
have
any
affect
on
MFT
space
already
allocated
and
used.

Article
ID:
174619
-
Last
Review:
October
16,
2008
-
Revision:
6.1

APPLIES
TO

- Microsoft Windows 2000 Professional Edition
- Microsoft Windows 2000 Server
- Microsoft Windows 2000 Advanced Server
- Microsoft Windows 2000 Datacenter Server
- Microsoft Windows NT Workstation 4.0 Developer Edition
- Microsoft Windows NT Server 4.0 Standard Edition
- Microsoft Windows XP Home Edition
- Microsoft Windows XP Professional
- Microsoft Windows Server 2003, Web Edition
- Microsoft Windows Server 2003, Datacenter Edition (32-bit x86)
- Microsoft Windows Server 2003, Enterprise Edition (32-bit x86)
- Microsoft Windows Server 2003, Standard Edition (32-bit x86)

Keywords: kbhotfixserver kbqfe kbenv kbinfo KB174619

Microsoft