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Subject: [PATCH][SHMEM] Factor out sbi->free\_inodes manipulations

Posted by [Pavel Emelianov](#) on Thu, 22 Nov 2007 16:57:22 GMT

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The shmem\_sb\_info structure has a number of free\_inodes. This value is altered in appropriate places under spinlock and with the sbi->max\_inodes != 0 check.

Consolidate these manipulations into two helpers.

This is minus 30 bytes of shmem.o and minus 4 :) lines of code.

Signed-off-by: Pavel Emelyanov <xemul@openvz.org>

---

```
diff --git a/mm/shmem.c b/mm/shmem.c
```

```
index e0d4b2e..abba17c 100644
```

```
--- a/mm/shmem.c
```

```
+++ b/mm/shmem.c
```

```
@@ -205,6 +205,29 @@ static void shmem_free_blocks(struct inode *inode, long pages)
 }
 }
```

```
+static int shmem_inc_inodes(struct shmem_sb_info *sbinfo)
```

```
+{
+ if (sbinfo->max_inodes) {
+ spin_lock(&sbinfo->stat_lock);
+ if (!sbinfo->free_inodes) {
+ spin_unlock(&sbinfo->stat_lock);
+ return -ENOMEM;
+ }
+ sbinfo->free_inodes--;
+ spin_unlock(&sbinfo->stat_lock);
+ }
+ return 0;
```

```
+}
```

```
+
```

```
+static void shmem_dec_inodes(struct shmem_sb_info *sbinfo)
```

```
+{
+ if (sbinfo->max_inodes) {
+ spin_lock(&sbinfo->stat_lock);
+ sbinfo->free_inodes++;
+ spin_unlock(&sbinfo->stat_lock);
+ }
+}
```

```
+}
```

```
+
```

```
/*
```

```

* shmем_recalc_inode - recalculate the size of an inode
*
@@ -777,11 +800,7 @@ static void shmем_delete_inode(struct inode *inode)
}
}
BUG_ON(inode->i_blocks);
- if (sbinfo->max_inodes) {
- spin_lock(&sbinfo->stat_lock);
- sbinfo->free_inodes++;
- spin_unlock(&sbinfo->stat_lock);
- }
+ shmем_dec_inodes(sbinfo);
  clear_inode(inode);
}

@@ -1370,15 +1389,8 @@ shmем_get_inode(struct super_block *sb, int mode, dev_t dev)
  struct shmем_inode_info *info;
  struct shmем_sb_info *sbinfo = SHMEM_SB(sb);

- if (sbinfo->max_inodes) {
- spin_lock(&sbinfo->stat_lock);
- if (!sbinfo->free_inodes) {
- spin_unlock(&sbinfo->stat_lock);
- return NULL;
- }
- sbinfo->free_inodes--;
- spin_unlock(&sbinfo->stat_lock);
- }
+ if (shmем_inc_inodes(sbinfo))
+ return NULL;

  inode = new_inode(sb);
  if (inode) {
@@ -1422,11 +1434,8 @@ shmем_get_inode(struct super_block *sb, int mode, dev_t dev)
    NULL);
    break;
  }
- } else if (sbinfo->max_inodes) {
- spin_lock(&sbinfo->stat_lock);
- sbinfo->free_inodes++;
- spin_unlock(&sbinfo->stat_lock);
- }
+ } else
+ shmем_dec_inodes(sbinfo);
  return inode;
}

@@ -1676,15 +1685,8 @@ static int shmем_link(struct dentry *old_dentry, struct inode *dir,

```

```

struct dentr
 * but each new link needs a new dentry, pinning lowmem, and
 * tmpfs dentries cannot be pruned until they are unlinked.
 */
- if (sbinfo->max_inodes) {
- spin_lock(&sbinfo->stat_lock);
- if (!sbinfo->free_inodes) {
- spin_unlock(&sbinfo->stat_lock);
- return -ENOSPC;
- }
- sbinfo->free_inodes--;
- spin_unlock(&sbinfo->stat_lock);
- }
+ if (shmem_inc_inodes(sbinfo))
+ return -ENOSPC;

dir->i_size += BOGO_DIRENT_SIZE;
inode->i_ctime = dir->i_ctime = dir->i_mtime = CURRENT_TIME;
@@ -1699,14 +1701,8 @@ static int shmem_unlink(struct inode *dir, struct dentry *dentry)
{
struct inode *inode = dentry->d_inode;

- if (inode->i_nlink > 1 && !S_ISDIR(inode->i_mode)) {
- struct shmem_sb_info *sbinfo = SHMEM_SB(inode->i_sb);
- if (sbinfo->max_inodes) {
- spin_lock(&sbinfo->stat_lock);
- sbinfo->free_inodes++;
- spin_unlock(&sbinfo->stat_lock);
- }
- }
+ if (inode->i_nlink > 1 && !S_ISDIR(inode->i_mode))
+ shmem_dec_inodes(SHMEM_SB(inode->i_sb));

dir->i_size -= BOGO_DIRENT_SIZE;
inode->i_ctime = dir->i_ctime = dir->i_mtime = CURRENT_TIME;

```

---

Subject: Re: [PATCH][SHMEM] Factor out sbi->free\_inodes manipulations  
Posted by [Hugh Dickins](#) on Fri, 23 Nov 2007 13:41:55 GMT  
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---

Looks good, but we can save slightly more there (depending on config), and I found your inc/dec names a little confusing, since the count is going the other way: how do you feel about this version? (I'd like it better if those helpers could take a struct inode \*, but they cannot.)  
Hugh

From: Pavel Emelyanov <xemul@openvz.org>

The shmem\_sb\_info structure has a number of free\_inodes. This value is altered in appropriate places under spinlock and with the sbi->max\_inodes != 0 check.

Consolidate these manipulations into two helpers.

This is minus 42 bytes of shmem.o and minus 4 :) lines of code.

Signed-off-by: Pavel Emelyanov <xemul@openvz.org>

Signed-off-by: Hugh Dickins <hugh@veritas.com>

---

```
mm/shmem.c | 72 ++++++-----
1 file changed, 34 insertions(+), 38 deletions(-)
```

--- 2.6.24-rc3/mm/shmem.c 2007-11-07 04:21:45.000000000 +0000

+++ linux/mm/shmem.c 2007-11-23 12:43:28.000000000 +0000

```
@@ -207,6 +207,31 @@ static void shmem_free_blocks(struct ino
 }
 }
```

```
+static int shmem_reserve_inode(struct super_block *sb)
```

```
+{
+ struct shmem_sb_info *sbinfo = SHMEM_SB(sb);
+ if (sbinfo->max_inodes) {
+ spin_lock(&sbinfo->stat_lock);
+ if (!sbinfo->free_inodes) {
+ spin_unlock(&sbinfo->stat_lock);
+ return -ENOMEM;
+ }
+ sbinfo->free_inodes--;
+ spin_unlock(&sbinfo->stat_lock);
+ }
+ return 0;
+}
```

```
+static void shmem_free_inode(struct super_block *sb)
```

```
+{
+ struct shmem_sb_info *sbinfo = SHMEM_SB(sb);
+ if (sbinfo->max_inodes) {
+ spin_lock(&sbinfo->stat_lock);
+ sbinfo->free_inodes++;
+ spin_unlock(&sbinfo->stat_lock);
+ }
+}
```

```

/*
 * shmem_recalc_inode - recalculate the size of an inode
 *
@@ -762,7 +787,6 @@ static int shmem_notify_change(struct de

static void shmem_delete_inode(struct inode *inode)
{
- struct shmem_sb_info *sbinfo = SHMEM_SB(inode->i_sb);
  struct shmem_inode_info *info = SHMEM_I(inode);

  if (inode->i_op->truncate == shmem_truncate) {
@@ -777,11 +801,7 @@ static void shmem_delete_inode(struct in
  }
}
BUG_ON(inode->i_blocks);
- if (sbinfo->max_inodes) {
- spin_lock(&sbinfo->stat_lock);
- sbinfo->free_inodes++;
- spin_unlock(&sbinfo->stat_lock);
- }
+ shmem_free_inode(inode->i_sb);
  clear_inode(inode);
}

@@ -1398,15 +1418,8 @@ shmem_get_inode(struct super_block *sb,
  struct shmem_inode_info *info;
  struct shmem_sb_info *sbinfo = SHMEM_SB(sb);

- if (sbinfo->max_inodes) {
- spin_lock(&sbinfo->stat_lock);
- if (!sbinfo->free_inodes) {
- spin_unlock(&sbinfo->stat_lock);
- return NULL;
- }
- sbinfo->free_inodes--;
- spin_unlock(&sbinfo->stat_lock);
- }
+ if (shmem_reserve_inode(sb))
+ return NULL;

  inode = new_inode(sb);
  if (inode) {
@@ -1450,11 +1463,8 @@ shmem_get_inode(struct super_block *sb,
  NULL);
  break;
}
- } else if (sbinfo->max_inodes) {
- spin_lock(&sbinfo->stat_lock);

```

```

- sbinfo->free_inodes++;
- spin_unlock(&sbinfo->stat_lock);
- }
+ } else
+ shmем_free_inode(sb);
  return inode;
}

```

```

@@ -1797,22 +1807,14 @@ static int shmем_create(struct inode *di
static int shmем_link(struct dentry *old_dentry, struct inode *dir, struct dentry *dentry)
{
  struct inode *inode = old_dentry->d_inode;
- struct shmем_sb_info *sbinfo = SHMEM_SB(inode->i_sb);

```

```

/*
 * No ordinary (disk based) filesystem counts links as inodes;
 * but each new link needs a new dentry, pinning lowmem, and
 * tmpfs dentries cannot be pruned until they are unlinked.
 */
- if (sbinfo->max_inodes) {
- spin_lock(&sbinfo->stat_lock);
- if (!sbinfo->free_inodes) {
- spin_unlock(&sbinfo->stat_lock);
- return -ENOSPC;
- }
- sbinfo->free_inodes--;
- spin_unlock(&sbinfo->stat_lock);
- }
+ if (shmем_reserve_inode(inode->i_sb))
+ return -ENOSPC;

```

```

  dir->i_size += BOGO_DIRENT_SIZE;
  inode->i_ctime = dir->i_ctime = dir->i_mtime = CURRENT_TIME;
@@ -1827,14 +1829,8 @@ static int shmем_unlink(struct inode *di
{
  struct inode *inode = dentry->d_inode;

```

```

- if (inode->i_nlink > 1 && !S_ISDIR(inode->i_mode)) {
- struct shmем_sb_info *sbinfo = SHMEM_SB(inode->i_sb);
- if (sbinfo->max_inodes) {
- spin_lock(&sbinfo->stat_lock);
- sbinfo->free_inodes++;
- spin_unlock(&sbinfo->stat_lock);
- }
- }
+ if (inode->i_nlink > 1 && !S_ISDIR(inode->i_mode))
+ shmем_free_inode(inode->i_sb);

```

```
dir->i_size -= BOGO_DIRENT_SIZE;
inode->i_ctime = dir->i_ctime = dir->i_mtime = CURRENT_TIME;
```

---

---

Subject: Re: [PATCH][SHMEM] Factor out sbi->free\_inodes manipulations  
Posted by [Pavel Emelianov](#) on Fri, 23 Nov 2007 13:53:07 GMT  
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---

Hugh Dickins wrote:

```
> Looks good, but we can save slightly more there (depending on config),
> and I found your inc/dec names a little confusing, since the count is
> going the other way: how do you feel about this version? (I'd like it
```

This is perfect =) Thanks for the masterclass!

```
> better if those helpers could take a struct inode *, but they cannot.)
```

```
> Hugh
```

```
>
```

```
>
```

```
> From: Pavel Emelyanov <xemul@openvz.org>
```

```
>
```

```
> The shmem_sb_info structure has a number of free_inodes. This
> value is altered in appropriate places under spinlock and with
> the sbi->max_inodes != 0 check.
```

```
>
```

```
> Consolidate these manipulations into two helpers.
```

```
>
```

```
> This is minus 42 bytes of shmem.o and minus 4 :) lines of code.
```

```
>
```

```
> Signed-off-by: Pavel Emelyanov <xemul@openvz.org>
```

```
> Signed-off-by: Hugh Dickins <hugh@veritas.com>
```

```
> ---
```

```
>
```

```
> mm/shmem.c | 72 ++++++-----
```

```
> 1 file changed, 34 insertions(+), 38 deletions(-)
```

```
>
```

```
> --- 2.6.24-rc3/mm/shmem.c 2007-11-07 04:21:45.000000000 +0000
```

```
> +++ linux/mm/shmem.c 2007-11-23 12:43:28.000000000 +0000
```

```
> @@ -207,6 +207,31 @@ static void shmem_free_blocks(struct ino
```

```
> }
```

```
> }
```

```
>
```

```
> +static int shmem_reserve_inode(struct super_block *sb)
```

```
> +{
```

```
> + struct shmem_sb_info *sbinfo = SHMEM_SB(sb);
```

```
> + if (sbinfo->max_inodes) {
```

```
> + spin_lock(&sbinfo->stat_lock);
```

```
> + if (!sbinfo->free_inodes) {
```

```

> + spin_unlock(&sbinfo->stat_lock);
> + return -ENOMEM;
> + }
> + sbinfo->free_inodes--;
> + spin_unlock(&sbinfo->stat_lock);
> + }
> + return 0;
> +}
> +
> +static void shmem_free_inode(struct super_block *sb)
> +{
> + struct shmem_sb_info *sbinfo = SHMEM_SB(sb);
> + if (sbinfo->max_inodes) {
> + spin_lock(&sbinfo->stat_lock);
> + sbinfo->free_inodes++;
> + spin_unlock(&sbinfo->stat_lock);
> + }
> +}
> +
> /*
> * shmem_recalc_inode - recalculate the size of an inode
> *
@@ -762,7 +787,6 @@ static int shmem_notify_change(struct de
>
> static void shmem_delete_inode(struct inode *inode)
> {
> - struct shmem_sb_info *sbinfo = SHMEM_SB(inode->i_sb);
> struct shmem_inode_info *info = SHMEM_I(inode);
>
> if (inode->i_op->truncate == shmem_truncate) {
@@ -777,11 +801,7 @@ static void shmem_delete_inode(struct in
> }
> }
> BUG_ON(inode->i_blocks);
> - if (sbinfo->max_inodes) {
> - spin_lock(&sbinfo->stat_lock);
> - sbinfo->free_inodes++;
> - spin_unlock(&sbinfo->stat_lock);
> - }
> + shmem_free_inode(inode->i_sb);
> clear_inode(inode);
> }
>
@@ -1398,15 +1418,8 @@ shmem_get_inode(struct super_block *sb,
> struct shmem_inode_info *info;
> struct shmem_sb_info *sbinfo = SHMEM_SB(sb);
>
> - if (sbinfo->max_inodes) {

```



```

> - spin_lock(&sbinfo->stat_lock);
> - if (!sbinfo->free_inodes) {
> - spin_unlock(&sbinfo->stat_lock);
> - return NULL;
> - }
> - sbinfo->free_inodes--;
> - spin_unlock(&sbinfo->stat_lock);
> - }
> + if (shmem_reserve_inode(sb))
> + return NULL;
>
> inode = new_inode(sb);
> if (inode) {
> @@ -1450,11 +1463,8 @@ shmem_get_inode(struct super_block *sb,
>     NULL);
>     break;
> }
> - } else if (sbinfo->max_inodes) {
> - spin_lock(&sbinfo->stat_lock);
> - sbinfo->free_inodes++;
> - spin_unlock(&sbinfo->stat_lock);
> - }
> + } else
> + shmem_free_inode(sb);
> return inode;
> }
>
> @@ -1797,22 +1807,14 @@ static int shmem_create(struct inode *di
> static int shmem_link(struct dentry *old_dentry, struct inode *dir, struct dentry *dentry)
> {
> struct inode *inode = old_dentry->d_inode;
> - struct shmem_sb_info *sbinfo = SHMEM_SB(inode->i_sb);
>
> /*
> * No ordinary (disk based) filesystem counts links as inodes;
> * but each new link needs a new dentry, pinning lowmem, and
> * tmpfs dentries cannot be pruned until they are unlinked.
> */
> - if (sbinfo->max_inodes) {
> - spin_lock(&sbinfo->stat_lock);
> - if (!sbinfo->free_inodes) {
> - spin_unlock(&sbinfo->stat_lock);
> - return -ENOSPC;
> - }
> - sbinfo->free_inodes--;
> - spin_unlock(&sbinfo->stat_lock);
> - }
> + if (shmem_reserve_inode(inode->i_sb))

```

```
> + return -ENOSPC;
>
> dir->i_size += BOGO_DIRENT_SIZE;
> inode->i_ctime = dir->i_ctime = dir->i_mtime = CURRENT_TIME;
> @@ -1827,14 +1829,8 @@ static int shmем_unlink(struct inode *di
> {
> struct inode *inode = dentry->d_inode;
>
> - if (inode->i_nlink > 1 && !S_ISDIR(inode->i_mode)) {
> - struct shmем_sb_info *sбinfo = SHMEM_SB(inode->i_sb);
> - if (sбinfo->max_inodes) {
> - spin_lock(&sбinfo->stat_lock);
> - sбinfo->free_inodes++;
> - spin_unlock(&sбinfo->stat_lock);
> - }
> - }
> + if (inode->i_nlink > 1 && !S_ISDIR(inode->i_mode))
> + shmем_free_inode(inode->i_sb);
>
> dir->i_size -= BOGO_DIRENT_SIZE;
> inode->i_ctime = dir->i_ctime = dir->i_mtime = CURRENT_TIME;
>
```

---

Subject: Re: [PATCH][SHMEM] Factor out sbi->free\_inodes manipulations  
Posted by [akpm](#) on Tue, 27 Nov 2007 05:23:11 GMT  
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---

On Fri, 23 Nov 2007 13:41:55 +0000 (GMT) Hugh Dickins <[hugh@veritas.com](mailto:hugh@veritas.com)> wrote:

```
> Looks good, but we can save slightly more there (depending on config),
> and I found your inc/dec names a little confusing, since the count is
> going the other way: how do you feel about this version? (I'd like it
> better if those helpers could take a struct inode *, but they cannot.)
> Hugh
>
>
> From: Pavel Emelyanov <xemul@openvz.org>
>
> The shmем_sb_info structure has a number of free_inodes. This
> value is altered in appropriate places under spinlock and with
> the sbi->max_inodes != 0 check.
>
> Consolidate these manipulations into two helpers.
>
> This is minus 42 bytes of shmем.o and minus 4 :) lines of code.
>
> Signed-off-by: Pavel Emelyanov <xemul@openvz.org>
```

```

> Signed-off-by: Hugh Dickins <hugh@veritas.com>
> ---
>
> mm/shmem.c | 72 ++++++++++++++++++++++++++++++++++++++-----
> 1 file changed, 34 insertions(+), 38 deletions(-)
>
> --- 2.6.24-rc3/mm/shmem.c 2007-11-07 04:21:45.000000000 +0000
> +++ linux/mm/shmem.c 2007-11-23 12:43:28.000000000 +0000
> @@ -207,6 +207,31 @@ static void shmem_free_blocks(struct ino
> }
> }
>
> +static int shmem_reserve_inode(struct super_block *sb)
> +{
> + struct shmem_sb_info *sbinfo = SHMEM_SB(sb);
> + if (sbinfo->max_inodes) {
> + spin_lock(&sbinfo->stat_lock);
> + if (!sbinfo->free_inodes) {
> + spin_unlock(&sbinfo->stat_lock);
> + return -ENOMEM;
> + }
> + sbinfo->free_inodes--;
> + spin_unlock(&sbinfo->stat_lock);
> + }
> + return 0;
> +}

```

It is peculiar to (wrongly) return -ENOMEM

```

> + if (shmem_reserve_inode(inode->i_sb))
> + return -ENOSPC;

```

and to then correct it in the caller..

Something boringly conventional such as the below, perhaps?

```

--- a/mm/shmem.c~shmem-factor-out-sbi-free_inodes-manipulations-fix
+++ a/mm/shmem.c
@@ -212,7 +212,7 @@ static int shmem_reserve_inode(struct su
    spin_lock(&sbinfo->stat_lock);
    if (!sbinfo->free_inodes) {
        spin_unlock(&sbinfo->stat_lock);
-   return -ENOMEM;
+   return -ENOSPC;
    }
    sbinfo->free_inodes--;
    spin_unlock(&sbinfo->stat_lock);

```

```

@@ -1679,14 +1679,16 @@ static int shmем_create(struct inode *di
static int shmем_link(struct dentry *old_dentry, struct inode *dir, struct dentry *dentry)
{
    struct inode *inode = old_dentry->d_inode;
+ int ret;

    /*
     * No ordinary (disk based) filesystem counts links as inodes;
     * but each new link needs a new dentry, pinning lowmem, and
     * tmpfs dentries cannot be pruned until they are unlinked.
     */
- if (shmем_reserve_inode(inode->i_sb))
- return -ENOSPC;
+ ret = shmем_reserve_inode(inode->i_sb);
+ if (ret)
+ goto out;

    dir->i_size += BOGO_DIRENT_SIZE;
    inode->i_ctime = dir->i_ctime = dir->i_mtime = CURRENT_TIME;
@@ -1694,7 +1696,8 @@ static int shmем_link(struct dentry *old
    atomic_inc(&inode->i_count); /* New dentry reference */
    dget(dentry); /* Extra pinning count for the created dentry */
    d_instantiate(dentry, inode);
- return 0;
+out:
+ return ret;
}

static int shmем_unlink(struct inode *dir, struct dentry *dentry)
-

```

---

Subject: Re: [PATCH][SHMEM] Factor out sbi->free\_inodes manipulations  
 Posted by [Hugh Dickins](#) on Tue, 27 Nov 2007 08:36:41 GMT  
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On Mon, 26 Nov 2007, Andrew Morton wrote:

```

>
> It is peculiar to (wrongly) return -ENOMEM
>
> > + if (shmем_reserve_inode(inode->i_sb))
> > + return -ENOSPC;
>
> and to then correct it in the caller..

```

Oops, I missed that completely.

> Something boringly conventional such as the below, perhaps?

Much better, thanks.

Hugh

---