Subject: [PATCH 8/8] Per-container pages reclamation
Posted by xemul on Mon, 09 Apr 2007 12:59:50 GMT
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Implement try_to_free_pages_in_container() to free the
pages in container that has run out of memory.

The scan_control->isolate_pages() function isolates the
container pages only.

```
diff -upr linux-2.6.20.orig/include/linux/swap.h linux-2.6.20-2/include/linux/swap.h
--- linux-2.6.20.orig/include/linux/swap.h 2007-03-06 19:09:50.000000000 +0300
+++ linux-2.6.20-2/include/linux/swap.h 2007-04-09 11:26:06.000000000 +0400
@@ -187,6 +187,9 @@ extern void swap_setup(void);

 /* linux/mm/vmscan.c */
 extern unsigned long try_to_free_pages(struct zone **, gfp_t);
+
+struct rss_container;
+extern unsigned long try_to_free_pages_in_container(struct rss_container *);
 extern unsigned long shrink_all_memory(unsigned long nr_pages);
 extern int vm_swappiness;
 extern int remove_mapping(struct address_space *mapping, struct page *page);
diff -upr linux-2.6.20.orig/mm/vmscan.c linux-2.6.20-2/mm/vmscan.c
--- linux-2.6.20.orig/mm/vmscan.c 2007-03-06 19:09:50.000000000 +0300
+++ linux-2.6.20-2/mm/vmscan.c 2007-04-09 11:26:06.000000000 +0400
@@ -872,6 +872,7 @@ force_reclaim_mapped:
   ClearPageActive(page);

   list_move(&page->lru, &zone->inactive_list);
+  container_rss_move_lists(page, 0);
   pgmoved++;
   if (!pagevec_add(&pvec, page)) {
    zone->nr_inactive += pgmoved;
@@ -900,6 +901,7 @@ force_reclaim_mapped:
   SetPageLRU(page);
   VM_BUG_ON(!PageActive(page));
   list_move(&page->lru, &zone->active_list);
+  container_rss_move_lists(page, 1);
   pgmoved++;
   if (!pagevec_add(&pvec, page)) {
    zone->nr_active += pgmoved;
@@ -1110,6 +1112,35 @@ out:
  return ret;
 }

+#ifdef CONFIG_RSS_CONTAINER
+unsigned long try_to_free_pages_in_container(struct rss_container *cnt)
```

```
+{
+ struct scan_control sc = {
+  .gfp_mask = GFP_KERNEL,
+  .may_writepage = 1,
+  .swap_cluster_max = 1,
+  .may_swap = 1,
+  .swappiness = vm_swappiness,
+  .cnt = cnt,
+  .isolate_pages = isolate_pages_in_container,
+ };
+ int node;
+ struct zone **zones;
+
+ for_each_node(node) {
+#ifdef CONFIG_HIGHMEM
+  zones = NODE_DATA(node)->node_zonelists[ZONE_HIGHMEM].zones;
+  if (do_try_to_free_pages(zones, sc.gfp_mask, &sc))
+   return 1;
+#endif
+  zones = NODE_DATA(node)->node_zonelists[ZONE_NORMAL].zones;
+  if (do_try_to_free_pages(zones, sc.gfp_mask, &sc))
+   return 1;
+ }
+ return 0;
+}
+#endif
+
 unsigned long try_to_free_pages(struct zone **zones, gfp_t gfp_mask)
 {
  struct scan_control sc = {
diff -upr linux-2.6.20.orig/mm/swap.c linux-2.6.20-2/mm/swap.c
--- linux-2.6.20.orig/mm/swap.c 2007-03-06 19:09:50.000000000 +0300
+++ linux-2.6.20-2/mm/swap.c 2007-04-09 11:26:06.000000000 +0400
@@ -30,6 +30,7 @@
 #include <linux/cpu.h>
 #include <linux/notifier.h>
 #include <linux/init.h>
+#include <linux/rss_container.h>

 /* How many pages do we try to swap or page in/out together? */
 int page_cluster;
@@ -147,6 +148,7 @@ void fastcall activate_page(struct page
   SetPageActive(page);
   add_page_to_active_list(zone, page);
   __count_vm_event(PGACTIVATE);
+  container_rss_move_lists(page, 1);
  }
  spin_unlock_irq(&zone->lru_lock);
```

```
 }

diff -upr linux-2.6.20.orig/mm/rss_container.c linux-2.6.20-2/mm/rss_container.c
--- linux-2.6.20.orig/mm/rss_container.c 2007-04-09 11:26:12.000000000 +0400
+++ linux-2.6.20-2/mm/rss_container.c 2007-04-09 11:26:06.000000000 +0400
@@ -96,6 +96,78 @@
  kfree(pc);
 }

+void container_rss_move_lists(struct page *pg, bool active)
+{
+ struct rss_container *rss;
+ struct page_container *pc;
+
+ if (!page_mapped(pg))
+  return;
+
+ pc = page_container(pg);
+ if (pc == NULL)
+  return;
+
+ rss = pc->cnt;
+
+ spin_lock(&rss->res.lock);
+ if (active)
+  list_move(&pc->list, &rss->active_list);
+ else
+  list_move(&pc->list, &rss->inactive_list);
+ spin_unlock(&rss->res.lock);
+}
+
+static unsigned long isolate_container_pages(unsigned long nr_to_scan,
+  struct list_head *src, struct list_head *dst,
+  unsigned long *scanned, struct zone *zone)
+{
+ unsigned long nr_taken = 0;
+ struct page *page;
+ struct page_container *pc;
+ unsigned long scan;
+ LIST_HEAD(pc_list);
+
+ for (scan = 0; scan < nr_to_scan && !list_empty(src); scan++) {
+  pc = list_entry(src->prev, struct page_container, list);
+  page = pc->page;
+  if (page_zone(page) != zone)
+   continue;
+
+  list_move(&pc->list, &pc_list);
```

```
+
+  if (PageLRU(page)) {
+   if (likely(get_page_unless_zero(page))) {
+    ClearPageLRU(page);
+    nr_taken++;
+    list_move(&page->lru, dst);
+   }
+  }
+ }
+
+ list_splice(&pc_list, src);
+
+ *scanned = scan;
+ return nr_taken;
+}
+
+unsigned long isolate_pages_in_container(unsigned long nr_to_scan,
+  struct list_head *dst, unsigned long *scanned,
+  struct zone *zone, struct rss_container *rss, int active)
+{
+ unsigned long ret;
+
+ spin_lock(&rss->res.lock);
+ if (active)
+  ret = isolate_container_pages(nr_to_scan, &rss->active_list,
+    dst, scanned, zone);
+ else
+  ret = isolate_container_pages(nr_to_scan, &rss->inactive_list,
+    dst, scanned, zone);
+ spin_unlock(&rss->res.lock);
+ return ret;
+}
+
 void container_rss_add(struct page_container *pc)
 {
  struct page *pg;
diff -upr linux-2.6.20.orig/include/linux/rss_container.h linux-2.6.20-2/include/linux/rss_container.h
--- linux-2.6.20.orig/include/linux/rss_container.h 2007-04-09 11:26:12.000000000 +0400
+++ linux-2.6.20-2/include/linux/rss_container.h 2007-04-09 11:26:06.000000000 +0400
@@ -24,6 +24,10 @@
 void mm_init_container(struct mm_struct *mm, struct task_struct *tsk);
 void mm_free_container(struct mm_struct *mm);

+void container_rss_move_lists(struct page *pg, bool active);
+unsigned long isolate_pages_in_container(unsigned long nr_to_scan,
+  struct list_head *dst, unsigned long *scanned,
+  struct zone *zone, struct rss_container *, int active);
 #else
```

```
 static inline int container_rss_prepare(struct page *pg,
   struct vm_area_struct *vma, struct page_container **pc)
@@ -52,5 +56,7 @@
 {
 }

+#define isolate_container_pages(nr, dst, scanned, rss, act, zone) ({ BUG(); 0;})
+#define container_rss_move_lists(pg, active) do { } while (0)
 #endif
 #endif
```