# 舞羊

当你的才华还撑不起你的野心时，你就应该静下心来学习。





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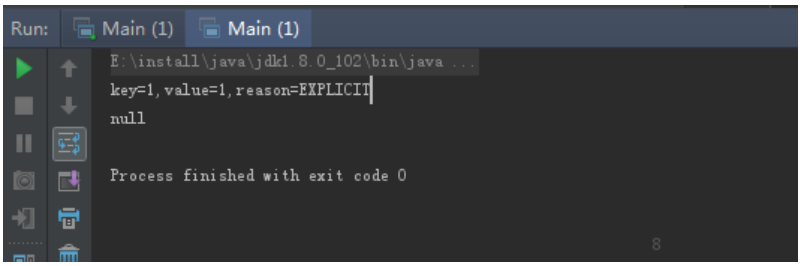
## Guava Cache 数据变化实现回调的监听器RemovalListener

当我们需要在缓存被移除的时候，得到通知产生回调，并做一些额外处理工作。这个时候RemovalListener就派上用场了。

```
public class Main {

   // 创建一个监听器
   private static class MyRemovalListener implements RemovalListener<Integer, Integer> {
   @Override
   public void onRemoval(RemovalNotification<Integer, Integer> notification) {
      String tips = String.format("key=%s,value=%s,reason=%s", notification.getKey(), notification.getValue
      System.out.println(tips);
   }
   }

   public static void main(String[] args) {

   // 创建一个带有RemovalListener监听的缓存
   Cache<Integer, Integer> cache = CacheBuilder.newBuilder().removalListener(new MyRemovalListener()).

   cache.put(1, 1);

   // 手动清除
   cache.invalidate(1);

   System.out.println(cache.getIfPresent(1)); // null
   }

}
```

使用invalidate()清除缓存数据之后，注册的回调被触发了




下面是只有主动删除数据使的回调

```
public class CacheConnection {

  public static RemovalListener<String, Connection> myRemovalListener = new RemovalListener<String, C
   @Override
   public void onRemoval(RemovalNotification<String, Connection> notification) {
      String tips = String.format("key=%s,value=%s,reason=%s in myRemovalListener", notification.getKey(
      System.out.println(tips);
      //when expireAfterAccess to do
```

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```
      if (notification.getCause().equals("EXPIRED") && notification.getValue() != null) {
        try {
          notification.getValue().close();
        } catch (SQLException e) {
          System.out.printf("Exception in myRemovalListener:\n");
          e.printStackTrace();
        }

        System.out.printf("Remove %s in cacheConnection", notification.getKey());
      }

    }
  };

  public static Cache<String, Connection> cacheConnection = CacheBuilder.newBuilder()
      //设置cache的初始大小为20000，要合理设置该值
      .initialCapacity(20000)
      //设置并发数为5，即同一时间最多只能有5个线程往cache执行写入操作
      .concurrencyLevel(100)
      //设置cache中的数据在600秒没有被读写将自动删除
      .expireAfterAccess(600, TimeUnit.SECONDS)
      //设置监听，当出现自动删除时的回调
      .removalListener(myRemovalListener)
      //构建cache实例
      .build();

  public static Connection getCache(String key)  {
    try {
      Connection var = cacheConnection.getIfPresent(key);
      return var;
    } catch (Exception e) {
      // TODO: handle exception
      System.out.println("the value of cacheConnection is null");
      e.printStackTrace();
      return null;
    }
  }

   public static void putCache(String key, Connection value) {
     cacheConnection.put(key, value);
   }


}
```

RemovalNotification中包含了缓存的key、value以及被移除的原因RemovalCause。通过源码可以看出，移除原因与容量管理方式是相对应的。下面是具体的消息

```
public enum RemovalCause {
  /**
   * The entry was manually removed by the user. This can result from the user invoking
   * {@link Cache#invalidate}, {@link Cache#invalidateAll(Iterable)}, {@link Cache#invalidateAll()},
   * {@link Map#remove}, {@link ConcurrentMap#remove}, or {@link Iterator#remove}.
   */
  EXPLICIT {
    @Override
    boolean wasEvicted() {
      return false;
    }
  },

  /**
   * The entry itself was not actually removed, but its value was replaced by the user. This can
   * result from the user invoking {@link Cache#put}, {@link LoadingCache#refresh}, {@link Map#put},
   * {@link Map#putAll}, {@link ConcurrentMap#replace(Object, Object)}, or
   * {@link ConcurrentMap#replace(Object, Object, Object)}.
   */
  REPLACED {
    @Override
    boolean wasEvicted() {
      return false;
    }
  },
```

```
  /**
   * The entry was removed automatically because its key or value was garbage-collected. This
   * can occur when using {@link CacheBuilder#weakKeys}, {@link CacheBuilder#weakValues}, or
   * {@link CacheBuilder#softValues}.
   */
  COLLECTED {
    @Override
    boolean wasEvicted() {
      return true;
    }
  },

  /**
   * The entry's expiration timestamp has passed. This can occur when using
   * {@link CacheBuilder#expireAfterWrite} or {@link CacheBuilder#expireAfterAccess}.
   */
  EXPIRED {
    @Override
    boolean wasEvicted() {
      return true;
    }
  },

  /**
   * The entry was evicted due to size constraints. This can occur when using
   * {@link CacheBuilder#maximumSize} or {@link CacheBuilder#maximumWeight}.
   */
  SIZE {
    @Override
    boolean wasEvicted() {
      return true;
    }
  };

  /**
   * Returns {@code true} if there was an automatic removal due to eviction (the cause is neither
   * {@link #EXPLICIT} nor {@link #REPLACED}).
   */
  abstract boolean wasEvicted();
}
```

监听器使用很简单，有几个特点需要注意下：

1、默认情况下，监听器方法是被同步调用的（在移除缓存的那个线程中执行）。如果监听器方法比较耗时，会导致调用者线程阻塞时间变长。下面这段代码，由于监听器执行需要2s，所以main线程调用invalidate()要2s后才能返回。

```
public class Main {

    // 创建一个监听器
    private static class MyRemovalListener implements RemovalListener<Integer, Integer> {
        @Override
        public void onRemoval(RemovalNotification<Integer, Integer> notification) {
            String tips = String.format("key=%s,value=%s,reason=%s", notification.getKey(), notification.getVal
            System.out.println(tips);

            try {
                // 模拟耗时
                Thread.sleep(2000);
            } catch (InterruptedException e) {
                e.printStackTrace();
            }

        }
    }

    public static void main(String[] args) {

        // 创建一个带有RemovalListener监听的缓存
        final Cache<Integer, Integer> cache = CacheBuilder.newBuilder().removalListener(new MyRemovalLis
        cache.put(1, 1);
```

```
        cache.put(2, 2);

        System.out.println("main...begin.");
        cache.invalidate(1);// 耗时2s
        System.out.println("main...over.");
    }

}
```

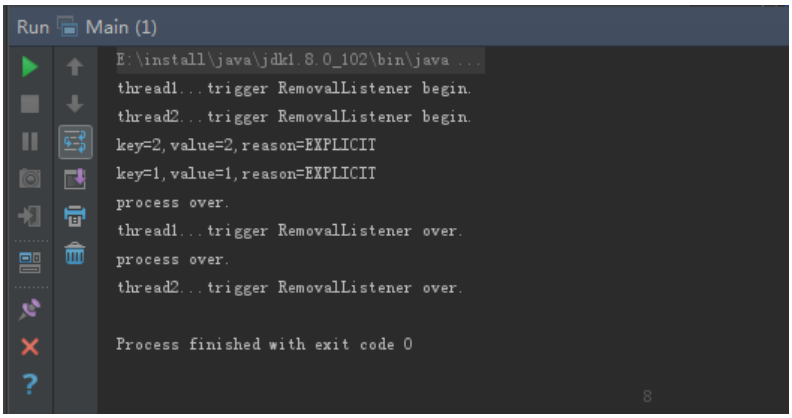
解决这个问题的方法是：使用异步监听RemovalListeners.asynchronous(RemovalListener, Executor)。

```
public class Main {

    // 创建一个监听器
    private static class MyRemovalListener implements RemovalListener<Integer, Integer> {
        @Override
        public void onRemoval(RemovalNotification<Integer, Integer> notification) {
            String tips = String.format("key=%s,value=%s,reason=%s", notification.getKey(), notification.getVal
            System.out.println(tips);

            try {
                // 模拟耗时
                Thread.sleep(2000);
            } catch (InterruptedException e) {
                e.printStackTrace();
            }

        }
    }

    public static void main(String[] args) {

        RemovalListener<Integer, Integer> async = RemovalListeners.asynchronous(new MyRemovalListener(
        // 创建一个带有RemovalListener监听的缓存
        final Cache<Integer, Integer> cache = CacheBuilder.newBuilder().removalListener(async).build();
        cache.put(1, 1);
        cache.put(2, 2);

        System.out.println("main...begin.");
        cache.invalidate(1);// main线程立刻返回
        System.out.println("main...over.");
    }

}
```

2、创建cache的时候只能添加1个监听器，这个监听器对象会被多个线程共享，所以如果监听器需要操作共享资源，那么一定要做好同步控制。下面这段代码可以看出：2个线程会交替执行监听器的发方法。

```
public class Main {

    // 创建一个监听器
    private static class MyRemovalListener implements RemovalListener<Integer, Integer> {
        @Override
        public void onRemoval(RemovalNotification<Integer, Integer> notification) {
            String tips = String.format("key=%s,value=%s,reason=%s", notification.getKey(), notification.getVal
            System.out.println(tips);

            try {
                // 模拟耗时
                Thread.sleep(2000);
            } catch (InterruptedException e) {
                e.printStackTrace();
            }

            System.out.println("process over.");
        }
```

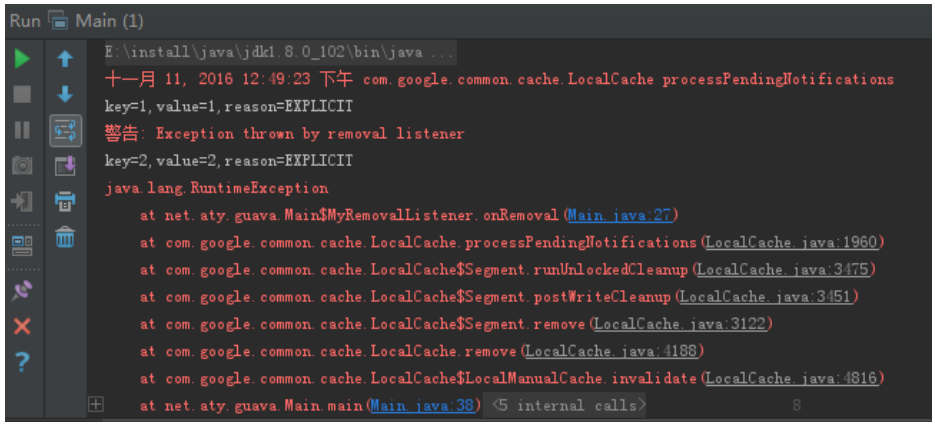
```
    }

    public static void main(String[] args) {

        // 创建一个带有RemovalListener监听的缓存
        final Cache<Integer, Integer> cache = CacheBuilder.newBuilder().removalListener(new MyRemovalList
        cache.put(1, 1);
        cache.put(2, 2);

        new Thread(new Runnable() {
            @Override
            public void run() {
                System.out.println("thread1...trigger RemovalListener begin.");
                cache.invalidate(1);
                System.out.println("thread1...trigger RemovalListener over.");
            }
        }).start();

        new Thread(new Runnable() {
            @Override
            public void run() {
                System.out.println("thread2...trigger RemovalListener begin.");
                cache.invalidate(2);
                System.out.println("thread2...trigger RemovalListener over.");
            }
        }).start();
    }

}
```




3、监听器中抛出的任何异常，在被记录到日志后，会被guava丢弃，不会导致监听器不可用。下面这段代码可以看到：监听器中抛出的异常只是被记录了(打印到了控制台)，并没有导致JVM退出，之后缓存被移除一样可以再次触发。

```
public class Main {

    // 创建一个监听器
    private static class MyRemovalListener implements RemovalListener<Integer, Integer> {
        @Override
        public void onRemoval(RemovalNotification<Integer, Integer> notification) {
            String tips = String.format("key=%s,value=%s,reason=%s", notification.getKey(), notification.getVal
            System.out.println(tips);

            throw new RuntimeException();
        }
    }

    public static void main(String[] args) {

        // 创建一个带有RemovalListener监听的缓存
        final Cache<Integer, Integer> cache = CacheBuilder.newBuilder().removalListener(new MyRemovalList
        cache.put(1, 1);
        cache.put(2, 2);

        cache.invalidate(1);
        cache.invalidate(2);
    }
```

```
}
```

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