第四次实验说明文档

本次实验共3个写者进程, 2个读者进程

orange's6r没有实现滚屏,最终结果不支持滚屏,屏幕满了之后会清空屏幕,否则显存会很快存满出错;为了展示方便,注释掉清屏代码,等到调度结果满一个屏幕之后ctrl+Z结束,观察结果(如果不断清屏会看不清,清屏的过程中终止可能得不到满屏的结果)。

说明:

1.封装系统调用参照orange's实现

2.进程调度模块的主要思路:

1.

读者优先、写着优先和解决饿死问题的信号量使用是不一样的,分别为它们编写读写时的进程体

2.

维护一个ready队列,开始时,所有的进程都加入(F不加入),如果P操作没有获得资源则弹出,存入信号量队列;

在信号量队列中的进程被其它的V资源释放之后,回到ready队列等待调度

3.进程体内每打印一次delay 10ms(一个时钟中断的间隔时间),用这样的方法模拟一个时间片

一、读者优先

1.同时读的数量设为1,写者进程饿死

```
Bochs x86-64 emulator, http://bochs.sourceforge.net/
                                                                    Poste Snapshot T I
                                                                SPY
ESPY
                                                                                ७७(1)
(START>)
                                  <read==1>
                                                                     <read==0>
  reading. <read==1> B reading. <read==1> B reading.B end.
                                                                     <read==0>
           <read==1> C reading .<read==1>
                                                                     <read==0>
                                              <read==0> B start.
           <read==1>
                                                                     B reading. <read==1>
  reading. <read==1> B reading.B end.
                                              <read==0>
                                                                                <read==1>
  reading.<read==1>
                                              <read==0>
                                                                                 <read==1>
                       <read==0> B start.
                                              B reading. <read==1>
                                                                     B reading. <read==1>
                       \langle read == 0 \rangle C start.
                                             C reading. <read==1>
A reading. <read==1>
  reading.B end.
                                                                      reading.<read==1>
                       <read==0>
                                                         <read==1>
\langle read == 0 \rangle B start.
                      B reading.<read==1>
                                             B reading. <read==1>
                                                                     B reading.B end.
<read==0>
                      C reading. <read==1>
                                              C reading.<read==1>
<read==0>
                                 .<read==1>
                                                                     \langle read == 0 \rangle B start.
 reading. <read==1> B reading. <read==1> B reading.B end.
                                                                     <read==0>
  reading.{read==1} C
                                                                     <read==0>
                        reading.<read==1>
           <read==1>
                                              <read==0> B start.
                                                                     B reading. <read==1>
                                              <read==0>
  reading. <read == 1> B reading. B end.
                                                                     C reading. <read==1>
  reading. <read == 1>
                                              <read==0>
                                                                                 <read==1>
                                              B reading. <read==1> B reading. <read==1>
                       <read==0> B start.
                       <read==0>
                                                                       reading.<read==1>
 reading.B end.
                                                         <read==1>
                       <read==0>
                                                         <read==1>
                      B reading. <read==1>
\langle read == 0 \rangle B start.
                                             B reading.Cread==1>
                                                                     B reading.B end.
<read==0> C
                        reading.<read==1>
                                                reading.<read==1>
                                  <read==1>
<read==0>
                                                                     <read==0> B start.
 reading. <read==1> B reading. <read==1> B reading.B end.
                                                                     <read==0>
                                                                     <read==0>
    ading.\langle read==1\rangle
                                  <read==1>
CTRL + 3rd button enables mouse
```

2.同时读的数量设为2>3个写者进程,写者进程饿死

```
Bochs x86-64 emulator, http://bochs.sourceforge.net/
                                                            USER Copy Poste Snapshot Land
    ა ტ ()
<START>>
                                                            reading.<read==2>
                                   <read==1>
                                                                     <read==2>
           \langle read == 1 \rangle B reading. \langle read == 1 \rangle
                                                                                 B reading
  end.
           <read==1> C reading.
                                                                     \langle read == 2 \rangle
           <read==1>
                                              <read==0>
                                                                                 <read==1>
           B reading. <read==2> C reading. <read==2> B reading. <read==2>
           <read==1>
                      B reading.B end.
                                              <read==0>
                                                                                 <read==1>
                       <read==2>
                                              <read==2>
                                                                                 <read==1>
                       <read==0>
                                                          <read==1> B start.
                                                                                 B reading
<read==2>
                                  <read==1> B reading.<read==1>
(read==2>
           B reading.B end.
                                  <read==1>
                                                          <read==1>
                                  <read==1>
<read==2>
                                                                     <read==0>
                                  B reading. <read==2>
                                                            reading. <read==2> B reading
           <read==1> B start.
                                  <read==1> B reading.B end.
<read==2>
                                                                     <read==0>
                                              <read==2>
                                                                     <read==2>
           <read==1>
           <read==1>
                                              <read==0>
                                                                                 <read==1>
           B reading. <read==2>
                                                          <read==1> B reading.<read==1>
             reading. <read==2>
                                  B reading.B end.
                                                          <read==1>
                                                                                 <read==1>
                       <read==2>
                                                          <read==1>
<read==0>
                                                          B reading. <read==2>
                                   \langle read == 1 \rangle B start.
\langle read == 2 \rangle B reading. \langle read == 2 \rangle
                                                                     B reading.B end.
                                                          <read==1>
                                                                      <read==2>
<read==0>
                                  <read==1>
<read==2>
                                  <read==1>
                                                                     <read==0>
                                  B reading. <read==2>
           <read==1> B start.
                                                                                 <read==1>
 reading.<read==1>
                                              <read==2>
                                                         B reading.B end.
                                                                                 <read==1>
           <read == 1>
                                              <read==2>
                                                                                 <read==1>
                                   CAPS SCRL
CTRL + 3rd button enables mouse | A:
                             NUM
```

3.同时读的数量设为3

此时写者进程有机会

```
Bochs x86-64 emulator, http://bochs.sourceforge.net/
                                                           USER Copy Poge Supplied T
((START>) A st
                                                                                     Ċ
                                                                                        (1)
                                  <read==1>
                                                           reading.<read==2>
           <read==3>
                                              <read==2> B reading.<read==2>
<read==2>
                                  <read==3>
                                              B reading.
                                                         B end.
                                                                     <read==2>
           <read == 1>
                                              <read==0> D start
                                                                     D writing.<writing>
                                                                     E writing. <writing>
                                              <writing> E start.
  writing.<writing>
                      E writing. <writing>
B reading. <read==1>
                                                                     <writing> B start
  writing. <writing>
  reading.<read==1>
                                                                     <read==2>
                                                                                B reading
  end.
                       <read==1>
                                                          <read==2>
                                                                      writing.<writing>
writing.<writing>
                       <read==0> <read==0> <read==0>
                       D writing
  writing.<writing>
                                              <writing>
  writing.<writing>
                        writing. <writing>
                                                                     <writing>
                      B reading. <read==1>
  reading. <read==1>
                                                                     <read==2> B reading
  end.
                       <read==1>
                                                          <read==2>
                                                         D start.
E start.
                       <read==0>
                                  <read==0> <read==0>
                                                                       writing. <writing>
                                                                       writing. writing>
 writing. <writing> writing>
                                              <writing>
                                               writing.
                                                                     <writing> B start.
                        writing. < writing>
  reading.<read==1>
                      B reading.
                                  <read==1>
                                                                     \langle read == 2 \rangle B reading
                                                          <read==2>
                       <read==1>
  end.
                       <read==0>
                                  <read==0>
                                              <read==0>
                                                                       writing. <writing>
                                                                     E writing. <writing>
  writing.<writing>
                                              <writing>
  writing.<writing>
                        writing. < writing>
                                                                     <writing> B start
                      B reading. <read==1>
                                                                     <read==2> B reading
  reading. <read==1>
                                                          <read==2>
                       <read==1>
                       <read==0>
                                  <read==0> <read==0>
                                                                     D writing. < writing>
   riting. <writing>
                                              <writing>
                                                                       writing. <writing>
CTRL + 3rd button enables mouse | A:
```

二、写着优先

无论同时读的数量设为几,读者进程饿死

```
Bochs x86-64 emulator, http://bochs.sourceforge.net/
                                                         USER Copy Poste snapshot
        Ċ
                                                                                 Ф
<<START>>
                                                        <writing>
                                 <writing>
\langle writing \rangle E start.
                                            E writing. <writing>
                      E writing.
                                 <writing>
                                                                    writing. < writing>
                                                        <writing>
  writing.E end.
                      <writing>
                                                                              <writing>
                                            E writing.
                      <writing>
                                                       <writing>
                                                                    writing.
                                                                             <writing>
                                   start.
                                            <writing>
                                                                              <writing>
  writing_writing>
                        writing.E end.
                                                                   E writing. < writing>
           <writing>
                                             <writing>
                                                       E start.
  writing. <writing>
                                              writing.E end.
                                                                   <writing>
                        writing. <writing>
                                 <writing>
                                                                   <writing>
           <writing>
                                                                               start.
  writing.
                        writing. <writing>
                                            E writing. <writing>
                                                                    writing.E end.
           <writing>
                                 <writing>
                                                       <writing>
<writing>
                        writing.
<writing>
           E start.
                                 <writing>
                                              writing. < writing>
                                                                    writing. < writing>
                      <writing>
                                                       <writing>
                                                                              <writing>
  writing.E end.
                      <writing>
                                   start.
                                            E writing.
                                                       <writing>
                                                                    writing
                                                                              <writing>
                        writing.E end.
                                                                              <writing>
                                            <writing>
  writing. <writing>
           <writing>
                                             <writing>
                                                                  E writing
                                                                              <writing>
                        writing. < writing>
                                            E writing.E end.
                                                                   <writing>
  writing. <writing>
           <writing>
                                 <writing>
                                                                   <writing> E start.
                      E writing. <writing>
  writing.
           <writing>
                                            E writing. <writing>
                                                                   E writing.E end.
<writing>
                                 <writing>
                                                       <writing>
                      E writing. <writing>
<writing> E start.
                                              writing.<writing>
                                                                    writing.<writing>
  writing.E end.
                      <writing>
                                                        <uriting>
                                                                              <uriting>
                      <writing>
                                            E writing.
                                                       <writing>
                                                                    writing. < writing>
                                   start.
  writing. <writing>
                      E writing.E end.
                                            <writing>
                                                                              <writing>
           <writing>
                                            <writing>
                                                       E start.
                                                                   E writing. <writing>
  writing. <writing> E writing. <writing> E writing. E end.
                                                                  <writing>
CTRL + 3rd button enables mouse | A+
                             МПМ
                                  rape enpi
```

三、解决饿死问题

核心是一个FAIR_lock信号量

无论同时读的数量设为几所有的进程都有机会执行

同时读的数量设为3:

```
Bochs x86-64 emulator, http://bochs.sourceforge.net/
                                                                                                                              Copy Poste Snapshot T Reset Suspend Power
(START>> #
                                                                                                                                         <read==2>
                                                                    <read==1>
                      <read==3>
                                                                                           <read==2> B reading.<read==2>
   read==2> B reading.B end. <read==1>
writing.<writing> D writing.<writing>
writing.<writing> E writing.<writing>
<read==2>
                                                                                                                                         <read==0>
                                                                                                                                                                    start.
                                                                                           D writing.D end
                                                                                                                                         <writing> E
                                                                                           E writing. <writing>
                                                                                                                                             writing.E end.
                                                                    <read==1>
                                                                                                                                         <read==0> B start.
<writing>
 reading.<read==1> B reading.<read==1>
                                                                                                                                         <read==2> B reading
   end. cread==1> C reading.
cread==1< reading.</pre>
cr
                                                                                                                                         <read==0> D start.
                                                                                                                                         <writing> E start.
                      <writing> E writing.<writing> E writing.<writing>
<writing>
                                                                    <read==1>
                                                                                                                                         <read==0> B start.
   riting> H start. H reading.<read==1> A reading.A end.
reading.<read==1> B reading.<read==1> C start. C reading.
                                                                                                                                         <read==2> B
                                                                                                                                                                    reading
                      <read==1> C reading.
<read==1> C reading.C
                                                                                                                                         <read==0> D start.
  end.
   writing. \writing> D writing. \writing> D writing.D end.
writing. <writing> E writing. <writing> E writing>
                                                                                                                                         <writing> E start.
                                                                                                                                         <read==0> B start
<writing>
                                                                    <read==1>
 reading.<read==1> B reading.<read==1> C start. C reading
                                                                                                                                         <read==2> B reading
   end. \langle read==1 \rangle C reading.\langle read==1 \rangle C reading.C end writing.\langle writing \rangle D writing.\langle writing \rangle D writing.D end
                                                                    <read==1> C reading.C end.
                                                                                                                                         <read==0> D start.
   end.
                                                                                                                                         <writing> E start.
   writing. <writing> E writing. <writing> E writing. <writing>
<writing>
                                                                                                                                         <read==0> B start.
                                                                    <read==1>
   reading. <read==1> B reading. <read==1> C
                                                                                                                                         <read==2> B reading
   <read==0> D start.
<writing> E start.
   writing. <writing>
                                                                                                                                        E writing.E end.
                                                writing. <writing> E writing. <writing>
```

同时读的数量设为2:

```
Bochs x86-64 emulator, http://bochs.sourceforge.net/
                                                                                                                                                                                                                                                       Copy Poste Snapshot T Reset SUSPEND POWER

SEE SUSPEND OF CONFIG 5 10 10 10
  START>>
                                                                                                                                                                                                                                                                          <read==2>
                                                                                                                                    <read==1>
                                                                                                                                                                                                                                                                          <read==0> D start.
                                          <read==1> B reading.<read==1> B reading.B end.
      writing. (writing) D writing. (writing) D writing. D end
                                                                                                                                                                                                                                                                          <writing> E start.
      writing. <writing> E writing. <writing> E writing>  E writing>
(writing>_
                                                                                              reading. <read == 1> C reading. <read == 1>
                                                                                                                                   <read == 1>
                                                                                                                                                                                                                                                                          <read==0> D start
 read==2>
    writing. <writing> D writing. <writing> D writing.D end writing. <writing> E writing> 
                                                                                                                                                                                                                                                                          <writing> E start.
                                                                                     E writing. <writing> E writing. <writing>
(writing>
                                                                                                                                                                                      reading. ⟨read==1⟩ B start. B reading
                                                                                              reading. <read == 1> C
                                                                                                                                   <read==1> B reading.<read==1> B reading.B end.
 (read==2>
                                                                                      D writing. (writing> D writing. (writing> D writing.D end.
E writing. (writing> E writing) E writing> E writing>
<read==0> D start.
(writing> E start.
                                                                                       <writing>
                                                                                                                                                                                                                            <read == 1>
                                                                                     C reading. (read==1) C reading. (read==1) C reading. C end.

D writing. (writing> D writing. (writing> D writing. D end.

E writing. (writing> E writing. (writing> E writing. (writing> C writing> E writing. (writing> C writing> C w
 read==0>
<read==0> D start
(writing> E start.
                                                                                       <read==2> B reading.B end.
                                                                                                                                                                                                                             <read==1>
                                                                                      D writing. (writing> D writing. (writing> D writing. D end.
E writing. (writing> E writing) E writing> E writing>
\langle read = = 0 \rangle D start.
 (writing> E start.
      writing.E end.
                                                                                       <writing> B start. B reading.<read==1> B reading.<read==1>
                                                                                                                                                                             <read==2> B reading.B end.
                                                                                       <read==0> D start.
                                                                                       <writing> E start.
       writing.D end
      writing. < writing > E writing. E end.
                                                                                                                                                                           <writing> A star
                                                                                                                                                                                                                                                                                              ading.<read==1>
```

同时读的数量设为1:

