Universidade de Brasília
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Relatório de Entrega de Atividades

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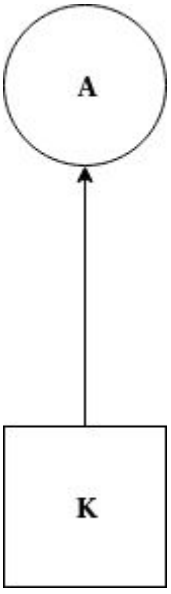
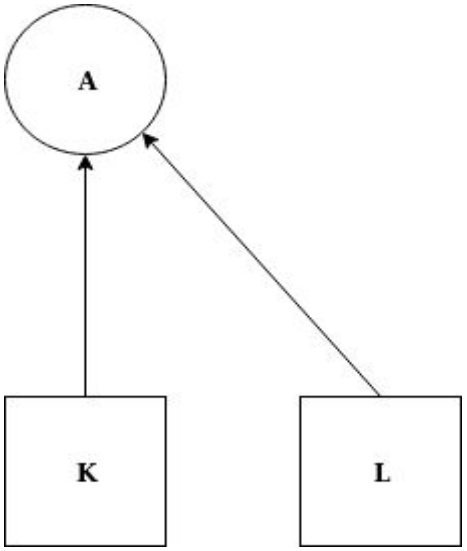
Atividade: Aula Prática 06 - Deadlocks

1.1.1 -

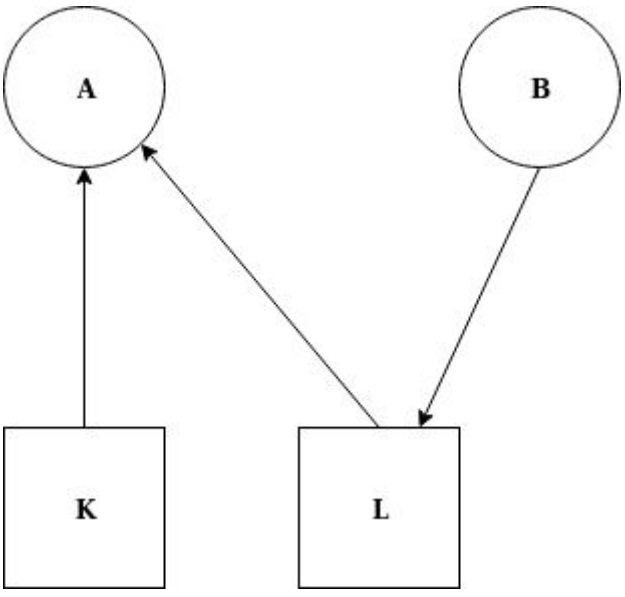
Estado 1:



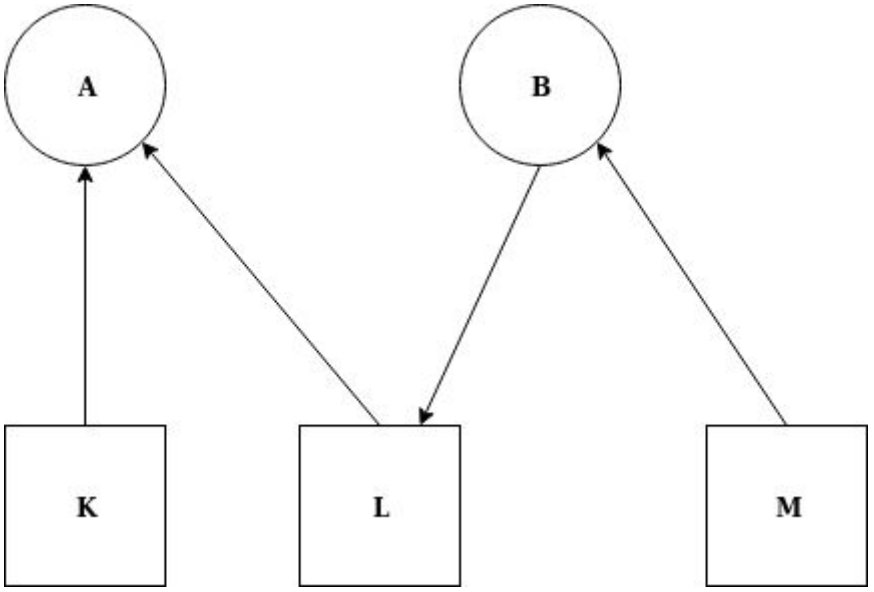
Estado 2:



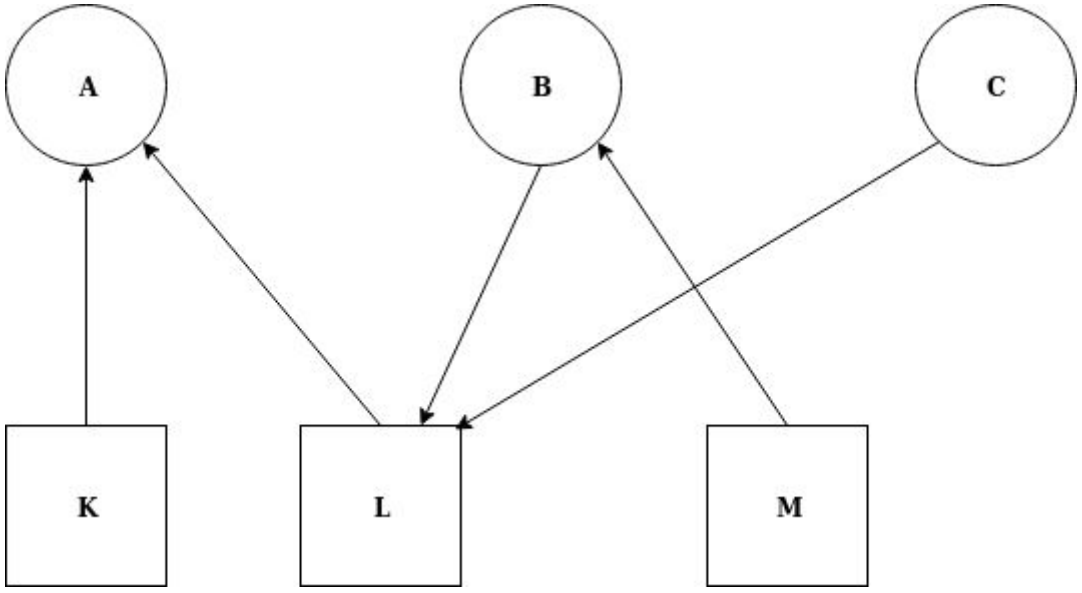
Estado 3:



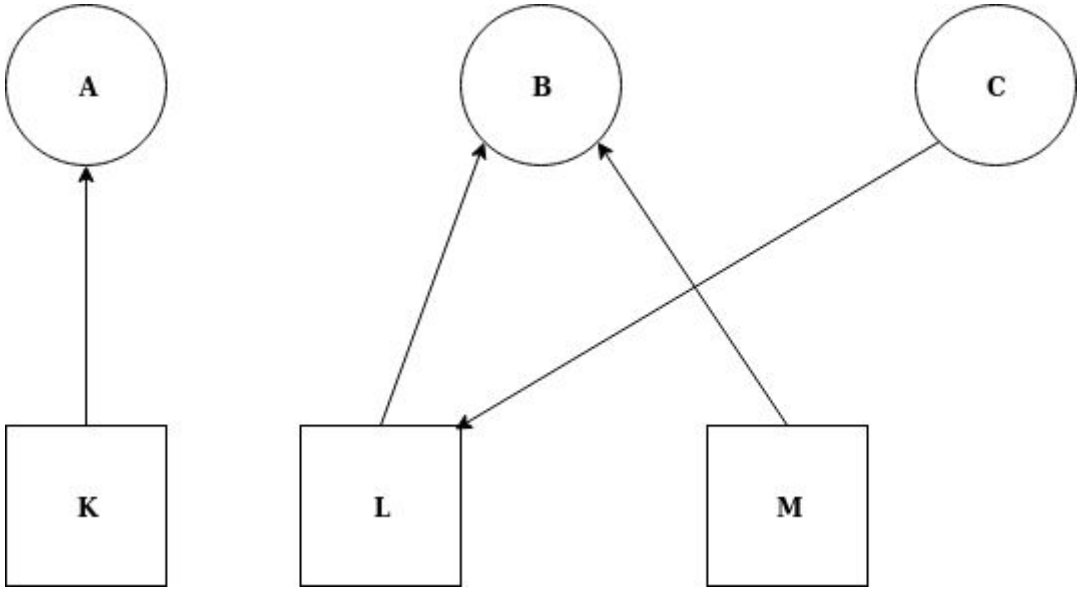
Estado 4:



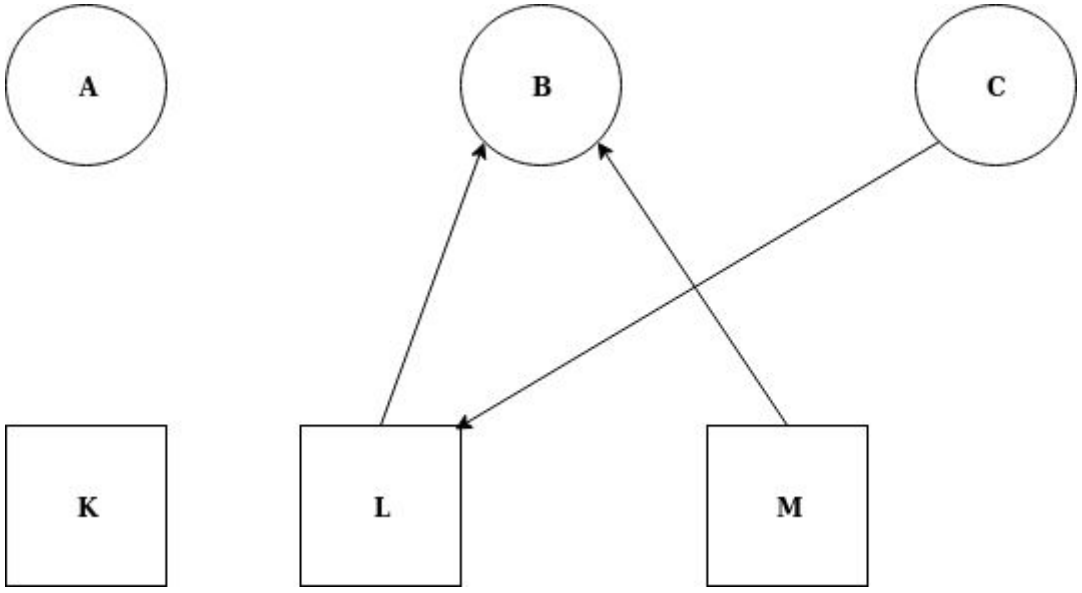
Estado 5:



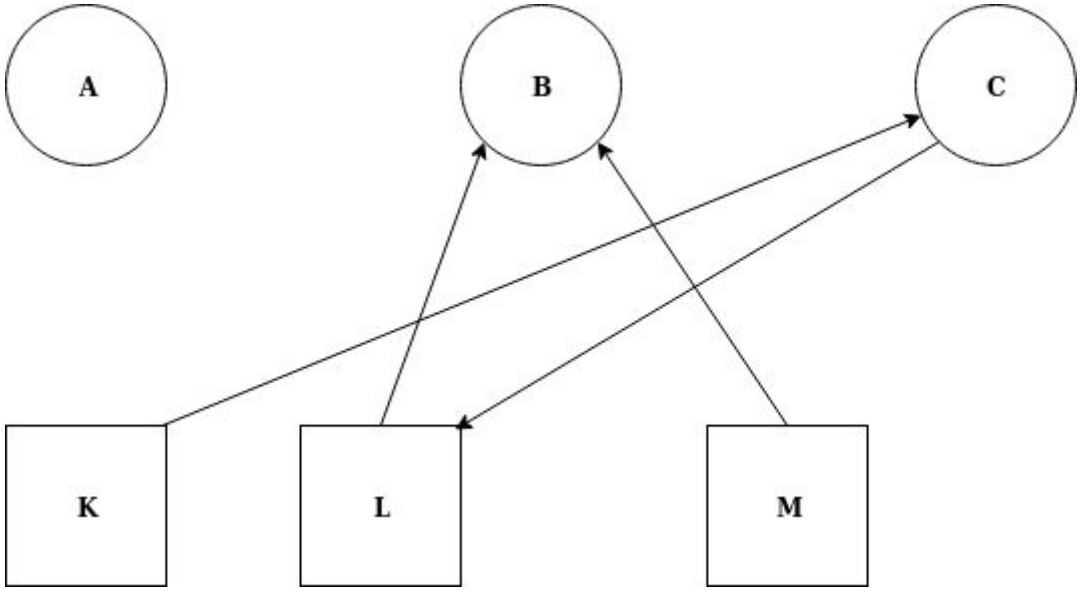
Estado 6:



Estado 7:



Estado 8:



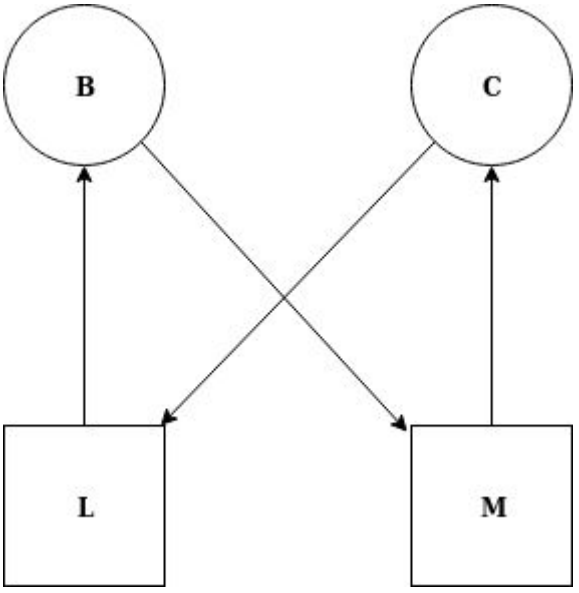
1.1.2 - É possível que ocorra um deadlock. Uma sequência que ocorre deadlock é:

B requisita L

C requisita M

B requisita M

C requisita L



Como há um ciclo no grafo temos um deadlock.

3.1.1 - O relatório gerado pelo helgrind:

$ valgrind --tool=helgrind ./exec.out

==843== Helgrind, a thread error detector
==843== Copyright (C) 2007-2017, and GNU GPL'd, by OpenWorks LLP et al.
==843== Using Valgrind-3.13.0 and LibVEX; rerun with -h for copyright info
==843== Command: ./exec.out
==843==
==843== ---Thread-Announcement--
==843==
==843== Thread #3 was created
==843== at 0x518287E: clone (clone.S:71)
==843== by 0x4E49EC4: create_thread (createthread.c:100)
==843== by 0x4E49EC4: pthread_create@@GLIBC_2.2.5 (pthread_create.c:797)
==843== by 0x4C36A27: ??? (in /usr/lib/valgrind/vgpreload_helgrind-amd64-linux.so)
==843== by 0x10879D: main (3-debug.c:12)
==843==
==843== ---Thread-Announcement--
==843==
==843== Thread #2 was created
==843== at 0x518287E: clone (clone.S:71)
==843== by 0x4E49EC4: create_thread (createthread.c:100)
==843== by 0x4E49EC4: pthread_create@@GLIBC_2.2.5 (pthread_create.c:797)
==843== by 0x4C36A27: ??? (in /usr/lib/valgrind/vgpreload_helgrind-amd64-linux.so)
==843== by 0x10879D: main (3-debug.c:12)
==843==
==843== --
==843==
==843== **Possible data race during read of size 4 at 0x309014 by thread #3**

==843== **Locks held: none**
==843== at 0x108742: contador (3-debug.c:6)
==843== by 0x4C36C26: ??? (in /usr/lib/valgrind/vgpreload_helgrind-amd64-linux.so)
==843== by 0x4E496DA: start_thread (pthread_create.c:463)
==843== by 0x518288E: clone (clone.S:95)
==843==
==843== **This conflicts with a previous write of size 4 by thread #2**
==843== **Locks held: none**
==843== at 0x10874B: contador (3-debug.c:6)
==843== by 0x4C36C26: ??? (in /usr/lib/valgrind/vgpreload_helgrind-amd64-linux.so)
==843== by 0x4E496DA: start_thread (pthread_create.c:463)
==843== by 0x518288E: clone (clone.S:95)
==843== Address 0x309014 is 0 bytes inside data symbol "var"
==843==
==843== ----------
==843==
==843== **Possible data race during write of size 4 at 0x309014 by thread #3**
==843== **Locks held: none**
==843== at 0x10874B: contador (3-debug.c:6)
==843== by 0x4C36C26: ??? (in /usr/lib/valgrind/vgpreload_helgrind-amd64-linux.so)
==843== by 0x4E496DA: start_thread (pthread_create.c:463)
==843== by 0x518288E: clone (clone.S:95)
==843==
==843== **This conflicts with a previous write of size 4 by thread #2**
==843== **Locks held: none**
==843== at 0x10874B: contador (3-debug.c:6)
==843== by 0x4C36C26: ??? (in /usr/lib/valgrind/vgpreload_helgrind-amd64-linux.so)
==843== by 0x4E496DA: start_thread (pthread_create.c:463)
==843== by 0x518288E: clone (clone.S:95)
==843== Address 0x309014 is 0 bytes inside data symbol "var"
==843==
==843== ---Thread-Announcement----------
==843==

==843== Thread #1 is the program's root thread
==843==
==843== ---Thread-Announcement----------
==843==
==843== Thread #11 was created
==843== at 0x518287E: clone (clone.S:71)
==843== by 0x4E49EC4: create_thread (createthread.c:100)
==843== by 0x4E49EC4: pthread_create@@GLIBC_2.2.5 (pthread_create.c:797)
==843== by 0x4C36A27: ??? (in /usr/lib/valgrind/vgpreload_helgrind-amd64-linux.so)
==843== by 0x10879D: main (3-debug.c:12)
==843==
==843== ----------
==843==
==843== **Possible data race during read of size 4 at 0x309014 by thread #1**
==843== **Locks held: none**
==843== at 0x1087A8: main (3-debug.c:15)
==843==
==843== **This conflicts with a previous write of size 4 by thread #11**
==843== **Locks held: none**
==843== at 0x10874B: contador (3-debug.c:6)
==843== by 0x4C36C26: ??? (in /usr/lib/valgrind/vgpreload_helgrind-amd64-linux.so)
==843== by 0x4E496DA: start_thread (pthread_create.c:463)
==843== by 0x518288E: clone (clone.S:95)
==843== Address 0x309014 is 0 bytes inside data symbol "var"
==843==
==843== ----------
==843==
==843== **Possible data race during write of size 4 at 0x309014 by thread #1**
==843== **Locks held: none**
==843== at 0x1087B1: main (3-debug.c:15)
==843==
==843== This conflicts with a previous write of size 4 by thread #11
==843== Locks held: none

```
==843==    at 0x10874B: contador (3-debug.c:6)
==843==    by 0x4C36C26: ??? (in /usr/lib/valgrind/vgpreload_helgrind-amd64-linux.so)
==843==    by 0x4E496DA: start_thread (pthread_create.c:463)
==843==    by 0x518288E: clone (clone.S:95)
==843==  Address 0x309014 is 0 bytes inside data symbol "var"
==843==
==843==
==843== For counts of detected and suppressed errors, rerun with: -v
==843== Use --history-level=approx or =none to gain increased speed, at
==843== the cost of reduced accuracy of conflicting-access information
==843== ERROR SUMMARY: 20 errors from 4 contexts (suppressed: 0 from 0)
```

O **ponto problemático do código** está no **acesso indiscriminado** da variável “var”, não há exclusão mútua. O helgrind detecta as inconsistências dos acessos a variável e nos indica que pode estar ocorrendo acessos simultâneos ao endereço de memória da variável “var”. Como por exemplo nessa saída: “**Possible data race during read of size 4 at 0x309014 by thread #1**”.