Transaction Processing
Exercise 2

Assignment 1: Which types of executing transactions exist? Which effects and goals do the different types of execution have?

Assignment 2: Explain the principle of the Lock-Unlock model. Which of the following executions is correct? Do the schedules ensure consistency?

<table>
<thead>
<tr>
<th></th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁</td>
<td>T₂</td>
<td>T₁</td>
<td>T₂</td>
<td>T₁</td>
</tr>
<tr>
<td>lock A</td>
<td>unlock A</td>
<td>lock B</td>
<td>unlock A</td>
<td>lock A</td>
</tr>
<tr>
<td>lock B</td>
<td>unlock B</td>
<td>lock C</td>
<td>unlock B</td>
<td>lock A</td>
</tr>
<tr>
<td>unlock B</td>
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<td>unlock C</td>
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<td>lock A</td>
</tr>
<tr>
<td>lock B</td>
<td>unlock B</td>
<td>lock C</td>
<td>unlock B</td>
<td>lock A</td>
</tr>
</tbody>
</table>

Assignment 3: Explain the concept of serializability.

Assignment 4: Explain the concept of a schedule.

Assignment 5: Explain the structure and meaning of the Read/Write-model. Which meaning does the concept of schedules have in this context?

Assignment 6: Formally define a schedule. In addition, formally define the following concepts in suitable order: serial schedule, complete schedule, complete transaction, \textit{SHUFFLE(T)} and transaction.
Assignment 7: Consider the following set of transactions $T$:

\[
T := \{T_1, T_2\}
\]

\[
T_1 := r_1(x)w_1(x)c_1
\]

\[
T_2 := r_2(x)r_2(y)w_2(y)c_2
\]

Are the following operator sequences $s_i$ schedules per definition? If so, are the schedules serial or complete?

\[
s_1 := r_1(x)r_2(x)r_2(y)w_1(x)w_2(y)
\]

\[
s_2 := r_1(x)
\]

\[
s_3 := r_2(x)r_1(x)w_2(y)r_2(y)w_1(x)
\]

\[
s_4 := r_2(x)r_2(y)r_1(x)w_1(x)c_1w_2(y)c_2
\]

\[
s_5 := r_2(x)r_2(y)r_1(x)w_1(x)r_2(y)w_2(y)c_1c_2
\]

\[
s_6 := r_2(x)r_2(y)w_2(y)c_2r_1(x)w_1(x)c_1
\]