|  |  |
| --- | --- |
| R(x) |  |
|  | R(x) |
| W(x) |  |
|  | R(y) |
| R(y) |  |
|  | W(y) |
|  | W(x) |
| commit |  |
|  | commit |

Lost update

b)

|  |  |
| --- | --- |
| R(x) |  |
|  | R(x) |
| W(x) |  |
|  | R(x) |
| abort |  |
|  | abort |

Keine Anomalie

c)

|  |  |
| --- | --- |
| R(x) |  |
|  | R(x) |
|  | R(y) |
|  | W(y) |
|  | W(x) |
| R(x) |  |
| W(z) |  |
| Commit |  |
|  | commit |

Unrepeatable Read

d)

|  |  |
| --- | --- |
| R(z) |  |
| R(x) |  |
| R(z) |  |
|  | R(y) |
| W(z) |  |
| W(y) |  |
|  | Commit |
| commit |  |

Keine Anomalie

e)

|  |  |
| --- | --- |
| R(x) |  |
| R(y) |  |
| W(x) |  |
|  | R(x) |
|  | W(y) |
|  | W(z) |
| Abort |  |
|  | commit |

Dirty read

4)

a)

|  |  |  |  |
| --- | --- | --- | --- |
| R(x) |  |  |  |
| W(x) |  |  |  |
|  | R(x) |  |  |
| W(x) |  |  |  |
|  |  | W(x) |  |
|  |  |  | W(x) |

1 und 2 können nur parallel laufen

1,2 vor 3

3 nach 4

b)

|  |  |  |
| --- | --- | --- |
|  | R(z) |  |
| R(x) |  |  |
| W(x) |  |  |
|  |  | R(y) |
|  | R(x) |  |
| W(y) |  |  |
| R(x) |  |  |
|  |  | W(z) |
|  | R(y) |  |
|  | R(z) |  |

T3 vor T1

T2 vor T3

T1 vor T2

c)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | R(x) |  |  |  |
| W(y) |  |  |  |  |
|  |  | W(y) |  |  |
|  |  |  |  | R(z) |
| R(z) |  |  |  |  |
|  |  |  | W(x) |  |
|  | R(z) |  |  |  |
|  |  |  | W(t) |  |
| W(t) |  |  |  |  |
|  |  | R(y) |  |  |

T4 vor T1

T1 vor T3

T2 vor T4

T2,T4,T1,T3,T5

d)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | W(x) |  |  |  |
| W(t) |  |  |  |  |
|  |  |  | R(t) |  |
| R(x) |  |  |  |  |
|  |  | R(t) |  |  |
| W(y) |  |  |  |  |
|  |  |  |  | R(y) |
|  |  | W(t) |  |  |
|  |  |  |  | W(y) |
|  |  |  |  | R(t) |
| R(z) |  |  |  |  |

T2 vor T1

T1 vor T3,T4,T5

T3 vor T5

T4 vor T3

T2,T1,T4,T3,T5

e)

|  |  |  |  |
| --- | --- | --- | --- |
| R(y) |  |  |  |
|  |  | W(x) |  |
|  | R(y) |  |  |
|  |  |  | R(x) |
| W(y) |  |  |  |
|  |  |  | W(z) |
|  |  |  | R(y) |
|  | W(y) |  |  |
|  | W(x) |  |  |

T3 vor T4

T1 vor T2

T2 vor T1

T4 vor T2

T1 vor T4

T3 vor T2