Esempio di ripresa a caldo

B(T1)
B(T2)
U(T2, O1, B1, A1)
I(T1, O2, A2)
B(T3)
C(T1)
B(T4)
U(T3,O2,B3,A3)
U(T4,O3,B4,A4)
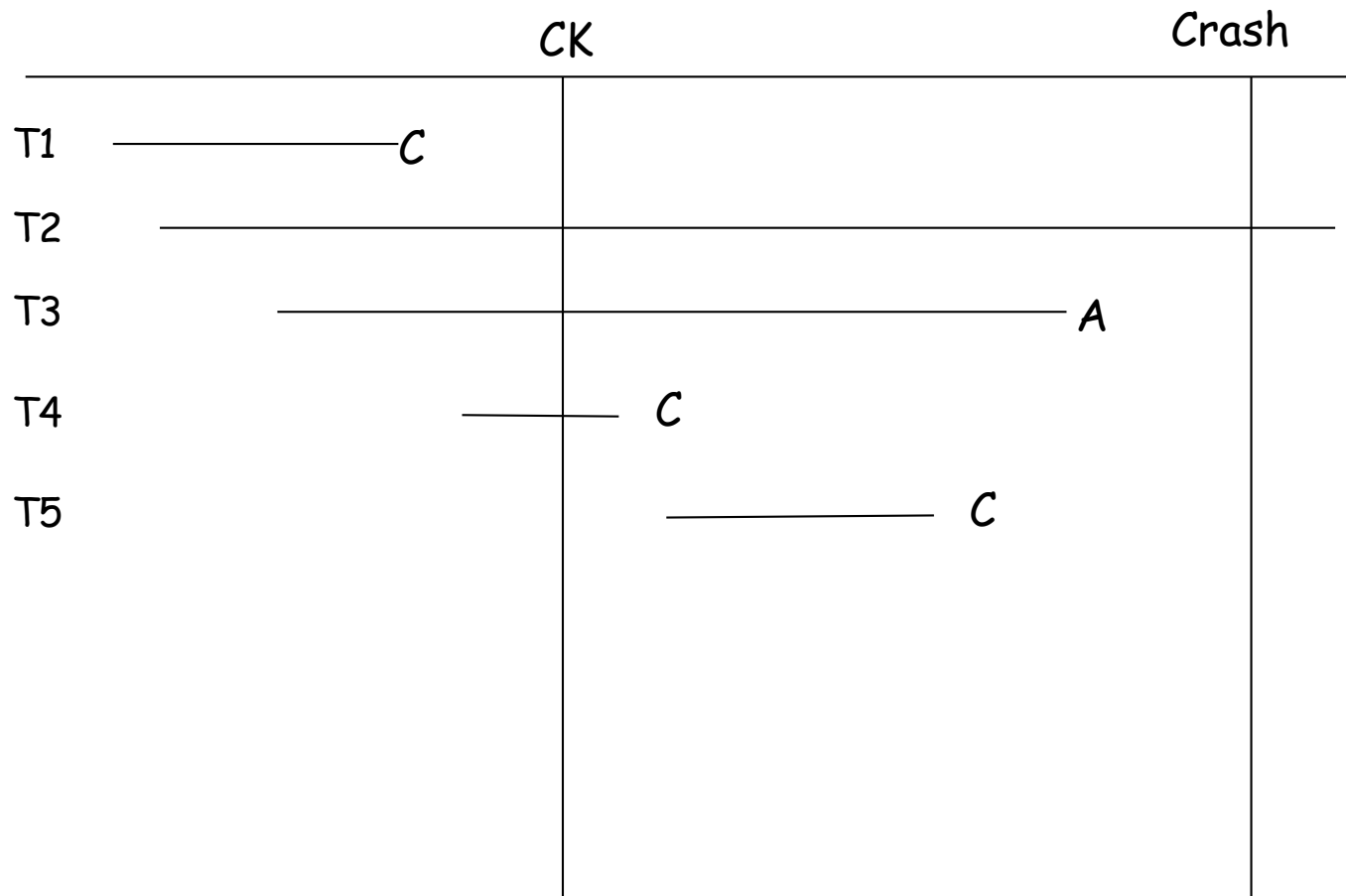CK(T2,T3,T4)
C(T4)
B(T5)
U(T3,O3,B5,A5)
U(T5,O4,B6,A6)
D(T3,O5,B7)
A(T3)
C(T5)
I(T2,O6,A8)

Esempio di ripresa a caldo

B(T1)
B(T2)
U(T2, O1, B1, A1)
I(T1, O2, A2)
B(T3)
C(T1)
B(T4)
U(T3,O2,B3,A3)
U(T4,O3,B4,A4)
CK(T2,T3,T4)
C(T4)
B(T5)
U(T3,O3,B5,A5)
U(T5,O4,B6,A6)
D(T3,O5,B7)
A(T3)
C(T5)
I(T2,O6,A8)

Ricodiamo l'algoritmo

Due fasi:

- ripercorrere il log all'indietro, fino a trovare l'ultimo checkpoint (e poi fino alla più vecchia azione delle transazioni di interesse), costruendo gli insiemi *UNDO* (transazioni da disfare) e *REDO* (transazioni da rifare) e disfacendo tutte le azioni delle transazioni in *UNDO*

- ripercorrere il log in avanti, rifacendo tutte le azioni delle transazioni in *REDO*

  – Assumiamo che non vengano eseguite le rollback, ma semplicemente registrate le abort nel log

1. Ricerca ckpt, costruzione insiemi e fase UNDO

B(T1)

B(T2)

U(T2, O1, B1, A1)

I(T1, O2, A2)

B(T3)

C(T1)

B(T4)

U(T3,O2,B3,A3)

U(T4,O3,B4,A4)

CK(T2,T3,T4)

C(T4)

B(T5)

U(T3,O3,B5,A5)

U(T5,O4,B6,A6)

D(T3,O5,B7)

A(T3)

C(T5)

I(T2,O6,A8)

0. UNDO = {}. REDO = {}

1. Ricerca ckpt, costruzione insiemi e fase UNDO

B(T1)
B(T2)
U(T2, O1, B1, A1)
I(T1, O2, A2)
B(T3)
C(T1)
B(T4)
U(T3,O2,B3,A3)
U(T4,O3,B4,A4)
CK(T2,T3,T4)
C(T4)
B(T5)
U(T3,O3,B5,A5)
U(T5,O4,B6,A6)
D(T3,O5,B7)
A(T3)
C(T5)
1. I(T2,O6,A8)

0. UNDO = {}. REDO = {}

1. UNDO = {T2}. REDO = {}
    D(O6)

1. Ricerca ckpt, costruzione insiemi e fase UNDO

B(T1)
B(T2)
U(T2, O1, B1, A1)
I(T1, O2, A2)
B(T3)
C(T1)
B(T4)
U(T3,O2,B3,A3)
U(T4,O3,B4,A4)
CK(T2,T3,T4)
 C(T4)
 B(T5)
 U(T3,O3,B5,A5)
 U(T5,O4,B6,A6)
 D(T3,O5,B7)
 A(T3)
2. C(T5)
1. I(T2,O6,A8)

0. UNDO = {}. REDO = {}

1. UNDO = {T2}. REDO = {}
   D(O6)

2. UNDO = {T2}. REDO = {T5}

1. Ricerca ckpt, costruzione insiemi e fase UNDO

B(T1)
B(T2)
U(T2, O1, B1, A1)
I(T1, O2, A2)
B(T3)
C(T1)
B(T4)
U(T3,O2,B3,A3)
U(T4,O3,B4,A4)
CK(T2,T3,T4)
C(T4)
B(T5)
U(T3,O3,B5,A5)
U(T5,O4,B6,A6)
D(T3,O5,B7)
3. A(T3)
2. C(T5)
1. I(T2,O6,A8)

0. UNDO = {}. REDO = {}

1. UNDO = {T2}. REDO = {}
    D(O6)

2. UNDO = {T2}. REDO = {T5}

3. UNDO = {T2, T3}. REDO = {T5}

1. Ricerca ckpt, costruzione insiemi e fase UNDO

B(T1)
B(T2)
U(T2, O1, B1, A1)
I(T1, O2, A2)
B(T3)
C(T1)
B(T4)
U(T3,O2,B3,A3)
U(T4,O3,B4,A4)
CK(T2,T3,T4)
 C(T4)
 B(T5)
 U(T3,O3,B5,A5)
 U(T5,O4,B6,A6)
 4. D(T3,O5,B7)
3. A(T3)
2. C(T5)
1. I(T2,O6,A8)

0. UNDO = {}. REDO = {}

1.   UNDO = {T2}. REDO = {}
     D(O6)

2. UNDO = {T2}. REDO = {T5}

3. UNDO = {T2, T3}. REDO = {T5}

4. O5 =B7

1. Ricerca ckpt, costruzione insiemi e fase UNDO

B(T1)
B(T2)
U(T2, O1, B1, A1)
I(T1, O2, A2)
B(T3)
C(T1)
B(T4)
U(T3,O2,B3,A3)
U(T4,O3,B4,A4)
CK(T2,T3,T4)
 C(T4)
 B(T5)
5. U(T3,O3,B5,A5)
   U(T5,O4,B6,A6)
4. D(T3,O5,B7)
3. A(T3)
2. C(T5)
1. I(T2,O6,A8)

0. UNDO = {}. REDO = {}

1. UNDO = {T2}. REDO = {}
    D(O6)

2. UNDO = {T2}. REDO = {T5}

3. UNDO = {T2, T3}. REDO = {T5}

4. O5 = B7

5. O3 = B5

1. Ricerca ckpt, costruzione insiemi e fase UNDO

B(T1)
B(T2)
U(T2, O1, B1, A1)
I(T1, O2, A2)
B(T3)
C(T1)
B(T4)
U(T3,O2,B3,A3)
U(T4,O3,B4,A4)
CK(T2,T3,T4)
6. C(T4)
   B(T5)
5. U(T3,O3,B5,A5)
   U(T5,O4,B6,A6)
4. D(T3,O5,B7)
3. A(T3)
2. C(T5)
1. I(T2,O6,A8)

0. UNDO = {}. REDO = {}

1. UNDO = {T2}. REDO = {}
    D(O6)

2. UNDO = {T2}. REDO = {T5}

3. UNDO = {T2, T3}. REDO = {T5}

4. O5 =B7

5. O3 = B5

6. UNDO = {T2, T3}. REDO = {T5, T4}

1. Ricerca ckpt, costruzione insiemi e fase UNDO

B(T1)
B(T2)
U(T2, O1, B1, A1)
I(T1, O2, A2)
B(T3)
C(T1)
B(T4)
7. U(T3,O2,B3,A3)
U(T4,O3,B4,A4)
CK(T2,T3,T4)
6. C(T4)
B(T5)
5. U(T3,O3,B5,A5)
U(T5,O4,B6,A6)
4. D(T3,O5,B7)
3. A(T3)
2. C(T5)
1. I(T2,O6,A8)

0. UNDO = {}. REDO = {}

1. UNDO = {T2}. REDO = {}
   D(O6)

2. UNDO = {T2}. REDO = {T5}

3. UNDO = {T2, T3}. REDO = {T5}

4. O5 = B7

5. O3 = B5

6. UNDO = {T2, T3}. REDO = {T5, T4}

7. O2 = B3

1. Ricerca ckpt, costruzione insiemi e fase UNDO

B(T1)
B(T2)

8. U(T2, O1, B1, A1)
   I(T1, O2, A2)
   B(T3)
   C(T1)
   B(T4)

7. U(T3,O2,B3,A3)
   U(T4,O3,B4,A4)
   CK(T2,T3,T4)

6. C(T4)
   B(T5)

5. U(T3,O3,B5,A5)
   U(T5,O4,B6,A6)

4. D(T3,O5,B7)

3. A(T3)

2. C(T5)

1. I(T2,O6,A8)

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0. UNDO = {}. REDO = {}

1. UNDO = {T2}. REDO = {}
   D(O6)

2. UNDO = {T2}. REDO = {T5}

3. UNDO = {T2, T3}. REDO = {T5}

4. O5 = B7

5. O3 = B5

6. UNDO = {T2, T3}. REDO = {T5, T4}

7. O2 = B3

8. O1 = B1

1. Ricerca ckpt, costruzione insiemi e fase UNDO

B(T1)

➡ B(T2)

8. U(T2, O1, B1, A1)

I(T1, O2, A2)

B(T3)

C(T1)

B(T4)

7. U(T3,O2,B3,A3)

U(T4,O3,B4,A4)

CK(T2,T3,T4)

6. C(T4)

B(T5)

5. U(T3,O3,B5,A5)

U(T5,O4,B6,A6)

4. D(T3,O5,B7)

3. A(T3)

2. C(T5)

1. I(T2,O6,A8)

0. UNDO = {}. REDO = {}

1. UNDO = {T2}. REDO = {}
   D(O6)

2. UNDO = {T2}. REDO = {T5}

3. UNDO = {T2, T3}. REDO = {T5}

4. O5 = B7

5. O3 = B5

6. UNDO = {T2, T3}. REDO = {T5, T4}

7. O2 = B3

8. O1 = B1

2. Fase REDO

B(T1)
B(T2)
8. U(T2, O1, B1, A1)
I(T1, O2, A2)
B(T3)
C(T1)
B(T4)
7. U(T3,O2,B3,A3)
U(T4,O3,B4,A4)
CK(T2,T3,T4)
6. C(T4)
B(T5)
5. U(T3,O3,B5,A5)
U(T5,O4,B6,A6)
4. D(T3,O5,B7)
3. A(T3)
2. C(T5)
1. I(T2,O6,A8)

0. UNDO = {T2,T3,T4}. REDO = {}

1. UNDO = {T2}. REDO = {}
   D(O6)

2. UNDO = {T2}. REDO = {T5}

3. UNDO = {T2, T3}. REDO = {T5}

4. O5 =B7

5. O3 = B5

6. UNDO = {T2, T3}. REDO = {T5, T4}

7. O2 =B3

8. O1=B1

2. Fase REDO

B(T1)
B(T2)
8. U(T2, O1, B1, A1)
I(T1, O2, A2)
B(T3)
C(T1)
B(T4)
7. U(T3,O2,B3,A3)
9. U(T4,O3,B4,A4)
CK(T2,T3,T4)
6. C(T4)
B(T5)
5. U(T3,O3,B5,A5)
U(T5,O4,B6,A6)
4. D(T3,O5,B7)
3. A(T3)
2. C(T5)
1. I(T2,O6,A8)

0. UNDO = {T2,T3,T4}. REDO = {}

1. UNDO = {T2}. REDO = {}
   D(O6)

2. UNDO = {T2}. REDO = {T5}

3. UNDO = {T2, T3}. REDO = {T5}

4. O5 =B7

5. O3 = B5

6. UNDO = {T2, T3}. REDO = {T5, T4}

7. O2 =B3

8. O1=B1

---

9. O3 = A4 (solo in caso di strategia Undo-Redo o Redo-only)

2. Fase REDO

B(T1)
B(T2)
8. U(T2, O1, B1, A1)
I(T1, O2, A2)
B(T3)
C(T1)
B(T4)
7. U(T3,O2,B3,A3)
9. U(T4,O3,B4,A4)
CK(T2,T3,T4)
6. C(T4)
B(T5)
5. U(T3,O3,B5,A5)
10. U(T5,O4,B6,A6)
4. D(T3,O5,B7)
3. A(T3)
2. C(T5)
1. I(T2,O6,A8)

0. UNDO = {T2,T3,T4}. REDO = {}

1. UNDO = {T2}. REDO = {}
D(O6)

2. UNDO = {T2}. REDO = {T5}

3. UNDO = {T2, T3}. REDO = {T5}

4. O5 =B7

5. O3 = B5

6. UNDO = {T2, T3}. REDO = {T5, T4}

7. O2 =B3

8. O1=B1

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9. O3 = A4

10. O4 = A6