Q1

a)

b)

Using License as key field

c)

d)

2 levels will be needed and 63 total blocks is needed

e)

Q2

For internal node

For leaf node

Q3

S1

|  |  |  |
| --- | --- | --- |
| T1 | T2 | T3 |
| Read(X) |  |  |
|  | Read(Z) |  |
| Read(Z) |  |  |
|  |  | Read(X) |
|  |  | Read(Y) |
| Write(X) |  |  |
| Commit |  |  |
|  |  | Write(Y) |
|  | Read(Y) |  |
|  |  | Commit |
|  | Write(Z) |  |
|  | Write(Y) |  |
|  | Commit |  |

Not serializable as w1(X) happens after r3(X) happens, and T3’s commits happening after T2’s Read(Y).

Strict scheduling as all writes happen after any T1 commits.

S2

|  |  |  |
| --- | --- | --- |
| T1 | T2 | T3 |
| Read(X) |  |  |
|  | Read(Z) |  |
|  |  | Read(X) |
| Read(Z) |  |  |
|  | Read(Y) |  |
|  |  | Read(Y) |
| Write(X) |  |  |
| Commit |  |  |
|  | Write(Z) |  |
|  |  | Write(Y) |
|  | Write(Y) |  |
|  |  | Commit |
|  | Commit |  |

Not serializable as w1(X) happens after r3(X) happens again, as well as w2(Y) and w3(Y) will result in conflicting values to the difference in the read(Y) timings as both r2(Y) and r3(Y) happen before any w3(Y) or w2(Y) commits happen.

Cascadeless as any system restore would undo any of the commits that happen.