# Example of applying write-ahead logging to recovery

A database is recovering after a hardware failure caused it to crash. We consider two database locations labeled and . When the recovery process begins, the values stored on the disk are and . The contents of the log file on the disk are:

|  |  |
| --- | --- |
| transaction ID | operation |
| 43 | begin transaction |
| 43 | change from “def” to “jk” |
| 997 | begin transaction |
| 997 | change from “pq” to “abc” |
| 43 | change from “jk” to “mno” |
| 997 | change from “abc” to “gh” |
| 43 | commit |

Once the recovery is complete, what values are stored at locations and ? Explain your answer.

[Solution is on next page]

## Solution

Transaction 43 was committed, so we need to replay its actions. This includes the following updates to : “pq” → “abc”→ “gh”. So final value of is “gh”.

Transaction 997 was not committed, so we need to roll it back. Undoing its actions in reverse order gives the following sequence of changes to location : “mno” → “jk”→ “def”. So final value of is “def”.