

A vulnerability I found from the tests was my lack of locks which made it unable to deal with threading causing race conditions and indeterminate outputs. Most of the vulnerabilities I found based off of the tests were that I did not apply the same logic and testing to `readat`, `undo`, and `close` as I did for `wreat`. For `close` I did not track whether the file had been closed already meaning that it could close twice causing a `FileClosedError`. I also did not check whether the byte size in `readat` was larger than the actual file size, meaning that it could try and read past the end of file. I also did not check if the file was closed when trying to read or `undo`. I also did not check if the `readat` byte value was a valid argument by checking if it is negative. I also forgot to check if my `pending_offset` was `None` before using it to check if the new offset is past the max possible offset causing an error of adding `int` and `None`.

I addressed the lock vulnerability by adding an attribute called `self.lock` which is a lock object. I also then added a `self.lock.acquire` before every method reading or writing the critical section and used a `try` for the actual code and finally to close the lock using `self.lock.release`. As for the file being able to be closed while already closed I added a `self.closed` variable to check whether the file is closed and will become `false` when initialized and then `true` when the file is closed and `false` when the file is opened in the `open` method. I added a check before `wreat`, `readat`, and `undo` to check if the file is closed and raised an exception if it was. I also added another condition to the `if` statement before the offset and max offset check. I also raised a `SeekPastEndOfFileError` if the `wreat` offset was past the max offset and also raised a `RepyArgumentError` if the offset was negative now throwing exceptions when the input is not valid