hw9 az147

1. Please list (at least two) ways to deal with failures caused by Mandelbugs.

   a. restart:

      This recovery action restarts a software component or service, which may require a few seconds, and which can only affect the transactions that the restarted component was processing. Moreover, this recovery action can be automated using IT management systems. Most failures due to aging- and non-aging-related Mandelbugs can be recovered with a software restart.

   b. reboot:

      This recovery action involves the reboot of a hardware or virtual machine, and can require a few minutes to complete. This action is necessary when the failure involves system-wide resources (e.g., a shared data structure), for which a simple component or service restart does not suffice.

   c. reconfigure:

      This recovery action changes a parameter of the hardware, virtual machine, or application before performing a restart or a reboot. The change of parameters often increases limits for system resources or timeout values, or involves a cleanup of system resources to improve performance. Reconfiguration can require up to several minutes, depending on whether the parameter tuning is done at the application (e.g., increasing timeouts of a software service), or at the system level (e.g., increasing memory and storage of a virtual machine, or migrating a service to another physical machine with a different hardware), and whether the recovery is supervised by automated software management tools.

   d. hot-fix:

      A hot-fix is a minor change to the source code of the IT system in production, or to the system software (e.g., an update of the OS, of the run-time system, and of library code). A hot-fix is created and applied in a short time (up to a few hours) without extensive testing of the change. The former type of hot-fix in the source code of the IT system can remove
      the root cause of a failure (e.g., by fixing a bug), or can avoid its effects (e.g., by retrying failing operations); the latter kind of hot-fix in system software can

also mitigate the effects of Mandelbugs (e.g., by introducing periodic garbage collection of OS resources).

2. Give a specific example of a non-aging-related Mandelbug where this action is likely to be
successful and why.

   eg.Network communication failure of an Automated Teller Machine (ATM).

- System description: ATM and server are connected via X.25 network; X.25 DCE interface exchanges acknowledgements and controls the data flow with the server.
- Error description and expression. If a bit variable is incorrectly set to 1, the DCE does not send an acknowledgement correctly, resulting in a communication error; the ATM software does not explicitly initialize the bit variable to 0, so the error occurs randomly depending on the state of the memory.
- Recovery method: The error can be corrected by restarting the ATM software, and is eventually corrected by the initialization of the bit variable.

This method sometimes succeeds because restarting software can change the state of

the memory, which could likely give us a initial value of 0

3. Give a specific example of an aging-related-bug where this action is likely to be successful
and why.

   The front-end screen is not responding in a large communication system.

   - Description: The user enters the system from the front-end screen. When a user starts a new session, a small temporary file is created on the server.
   - Error Description and Performance The session ends without cleaning up the temporary files, resulting in thousands of temporary files to accumulate in the server's file system. This has the effect of slowing down the server. The front-end screen freezes at random intervals. Screens freeze more frequently after restarting the server.
   - Recovery actions. The developer implemented a back-end tool that periodically removed temporary files from the server and deleted them at a later time. and delete them at a later time.

This could the likely work because though the screen freezing behavior is nondeterministic, the the reason causing it is clear, so frequently cleaning the file will save the server from this Mandelbug.