6.033 Computer System Engineering

Spring 2009

Atomicity

Failures: 1)   Replicate + vote
            2)   Recoverability

M_1 → M_2

No "partial" state
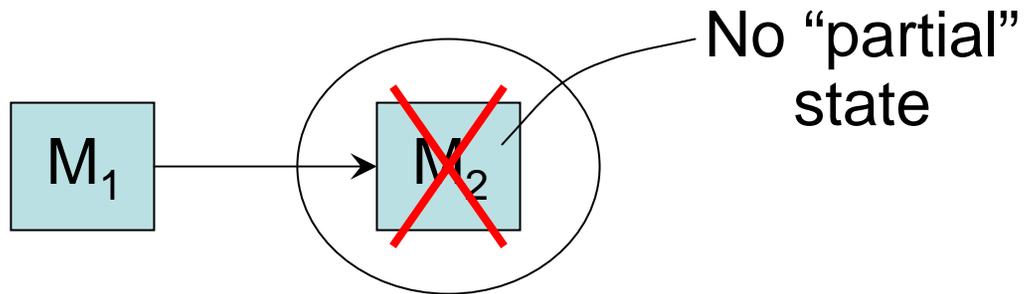
xfer (from, to, $ amount)

"All or nothing"

RECOVERABILITY

Concurrency

$S = 1000$ A_1 before A_2

xfer $(S, C, 100) : A_1$ OR

xfer $(S, C, 200) : A_2$ A_2 before A_1

ISOLATION

Atomicity

- Hide compositeness of actions
- REC + ISO

- Consistency $\rightarrow$ Invariant
- Durability

Recoverability

-     Fail-fast
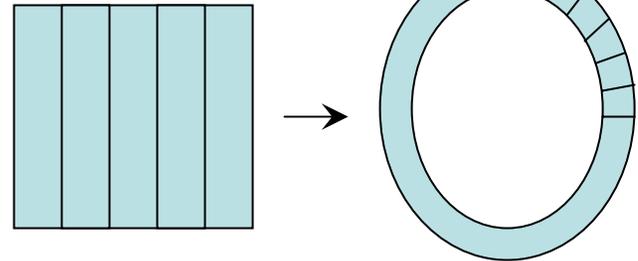-   Repair (recover)
-     Restarts

1)   Recoverable sector
2)   Version history
3)   Logs

Model

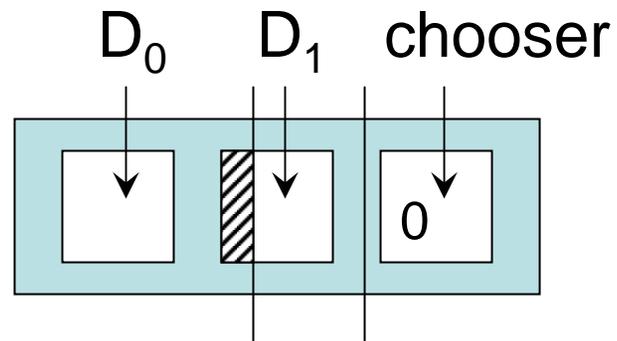- No concurrency
- No hardware errors
- Software errors

App

OS Buffer

Model

```
careful_put (sec, data)
   "     _get
```

Solution: Copy

D$_0$ D$_1$ chooser

0

Golden Rule:
Never modify only copy.

Commit point

- Before ➜ not visible

- After ➜ visible

Generalize

```
begin_ra()
                        ABORT()
    pre-commit

COMMIT()

    post-commit

end_ra()
```