\{\text{Append-only}\} \text{ Storage}

"The log is the data"

\text{Paper file systems:} \quad \text{Robust}

↓

\text{Never erase anything}

\text{Computer file systems:} \quad \text{Fragile}

↓

\text{Overwrite data in place}

\text{Reason: 30 years of storage}

"Too expensive to waste"
RELIABLE COMPUTER
FILE SYSTEM
- TIME-SHARING FILE SYSTEM
- DATABASE MGT SYSTEM

DATABASE

APPLICATION
FILE SYSTEM

DISK

TAPE

LOG
RELIABLE COMPUTER FILE SYSTEM
- TIME-SHARING FILE SYSTEM
- DATABASE MGT SYSTEM

APPLICATION
FILE SYSTEM

DISK

CACHE

DATABASE

LOG

② APPEND-ONLY SEMANTICS HERE
DATA STORAGE SEMANTICS

I. READ/WRITE (CELLS)

WRITE(A, DATA) → A
READ(A, DATA) → A

II. APPEND-ONLY (IMMUTABLE OBJECTS)

APPEND(A, DATA, V#) → A
READ(A, DATA, V#) → A

allows application to participate in recovery
IMPLEMENTATION

System history

Garbage collection pointer

Finite magnetic disk

Write pointer
IMPLEMENTATION

Low-cost optical disk reader

Writeable optical disk

Magnetic disk

System history

Write pointer