

PAOF: Parallel Append-Only File v1.0.0

연세대학교 컴퓨터과학과 서주연

2020년 10월



과제명: IoT 환경을 위한 고성능 플래시 메모리
스토리지 기반 인메모리 분산 DBMS 연구개발

과제번호: 2017-0-00477



과학기술정보통신부
Ministry of Science and ICT



연세대학교
YONSEI UNIVERSITY



정보통신기술진흥센터
Institute for Information & communications Technology Promotion



목차

01 Background

02 PAOF Logging Process

03 PAOF Recovery Process

04 Module Experiment

05 Plan



목차

01 Background

- Append Only File (AOF)
- AOF Rewrite

02 PAOF Logging Process

03 PAOF Recovery Process

04 Module Experiment

05 Plan

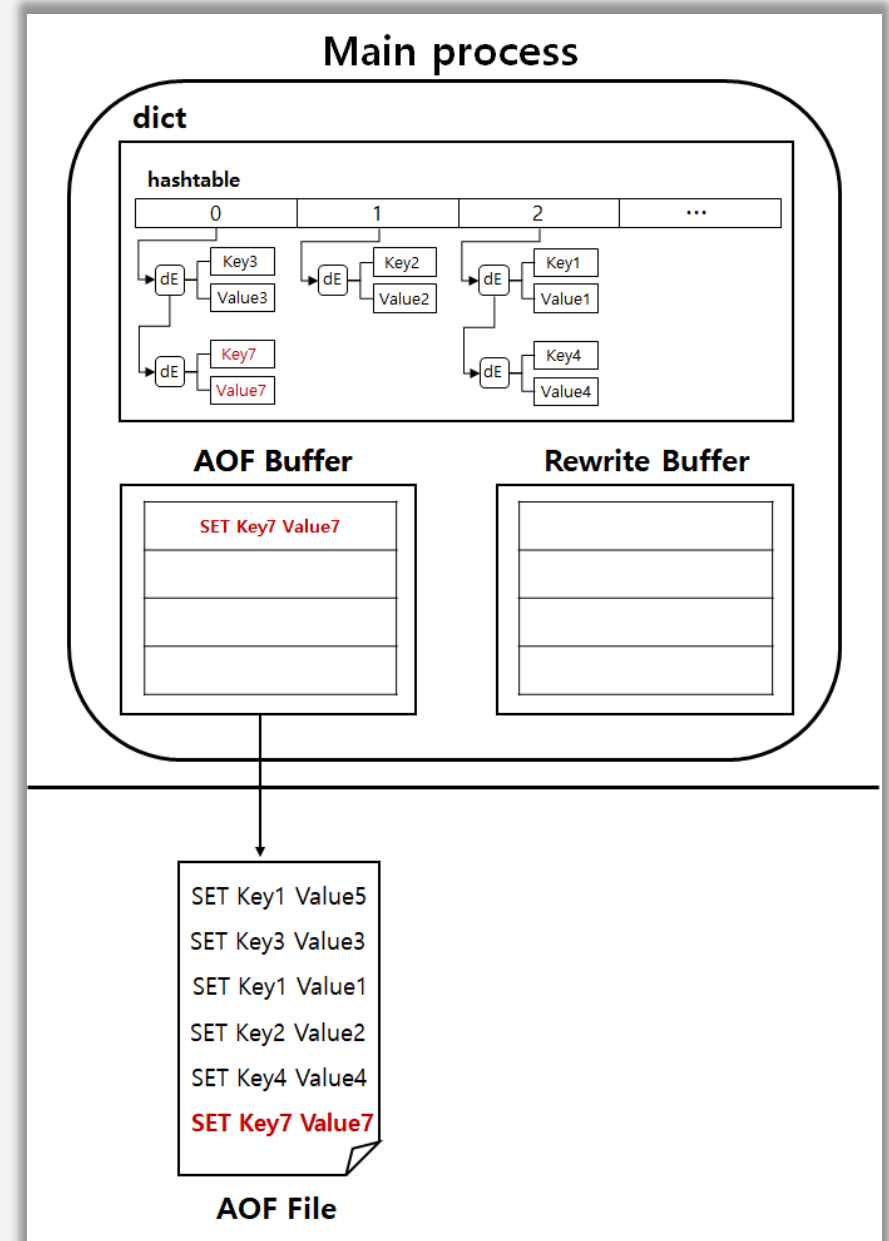
Background

↳ Append Only File (AOF)

- Redis Persistence Method : RDB & AOF

• Append Only File (AOF)

- Memory state를 변경시키는 Command들이 요청되는 경우 해당 명령에 대하여 Log로 저장하는 방식
- Hash Table에 데이터 저장 후 AOF 버퍼에 Log 기록, AOF fsync option에 따라 AOF 파일로 Log를 append



Background

↳ Append Only File (AOF)

- Redis Persistence Method : RDB & AOF

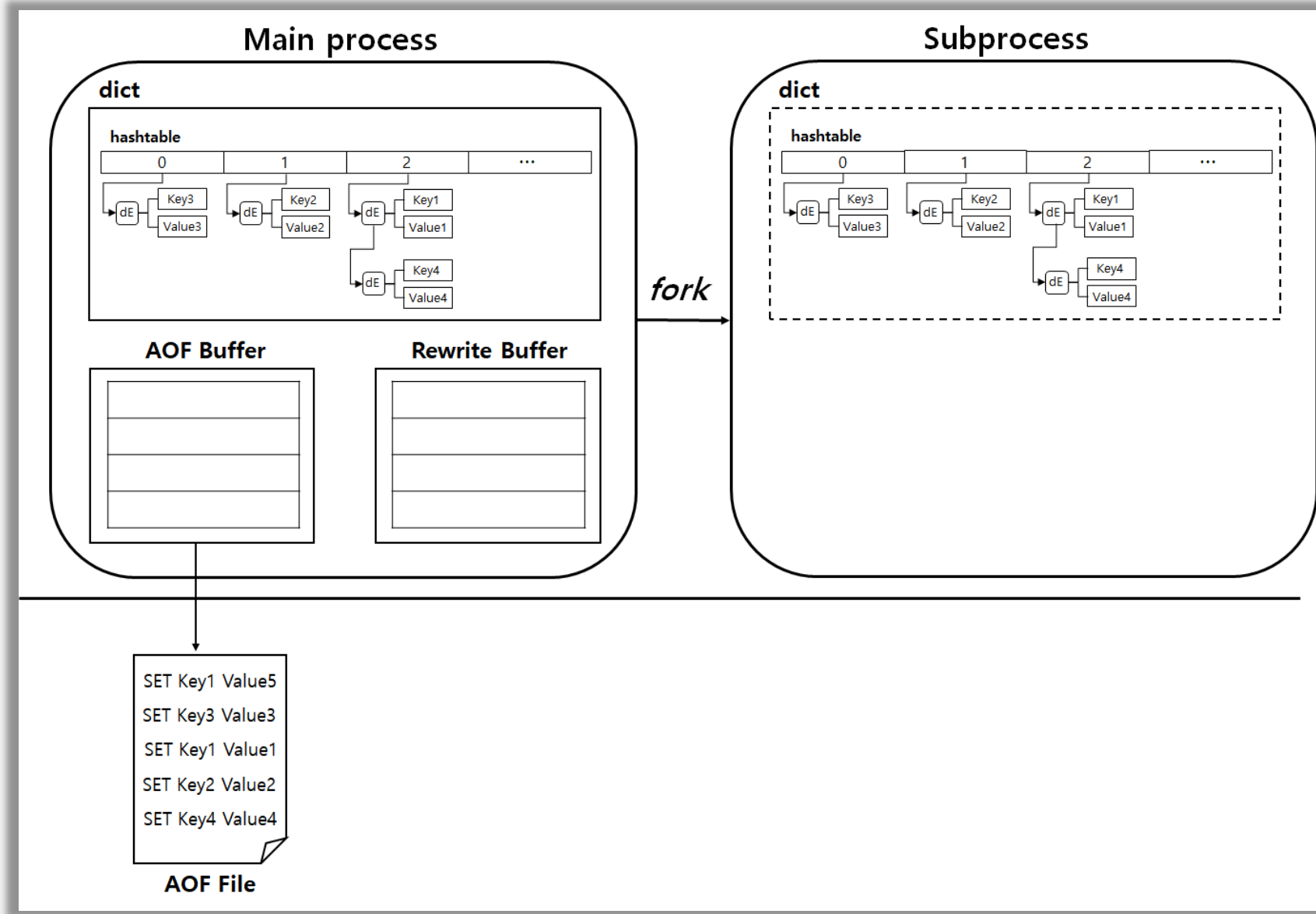
- **Append Only File (AOF)**

- 장점 : 데이터 유실 발생 가능성이 있지만 아주 적음
- 단점 : AOF 파일은 텍스트 형식이고 압축하지 않음 → 자체 Log 길이가 김
Disk I/O가 꾸준히 발생 → 성능 저하
복구 시 저장된 operation을 처음부터 다시 replay → 전반적으로 다른 복구보다 느림
로그 데이터 양이 많아 AOF 파일의 크기가 매우 커짐 → AOF Rewrite를 통해 개선

01

Background

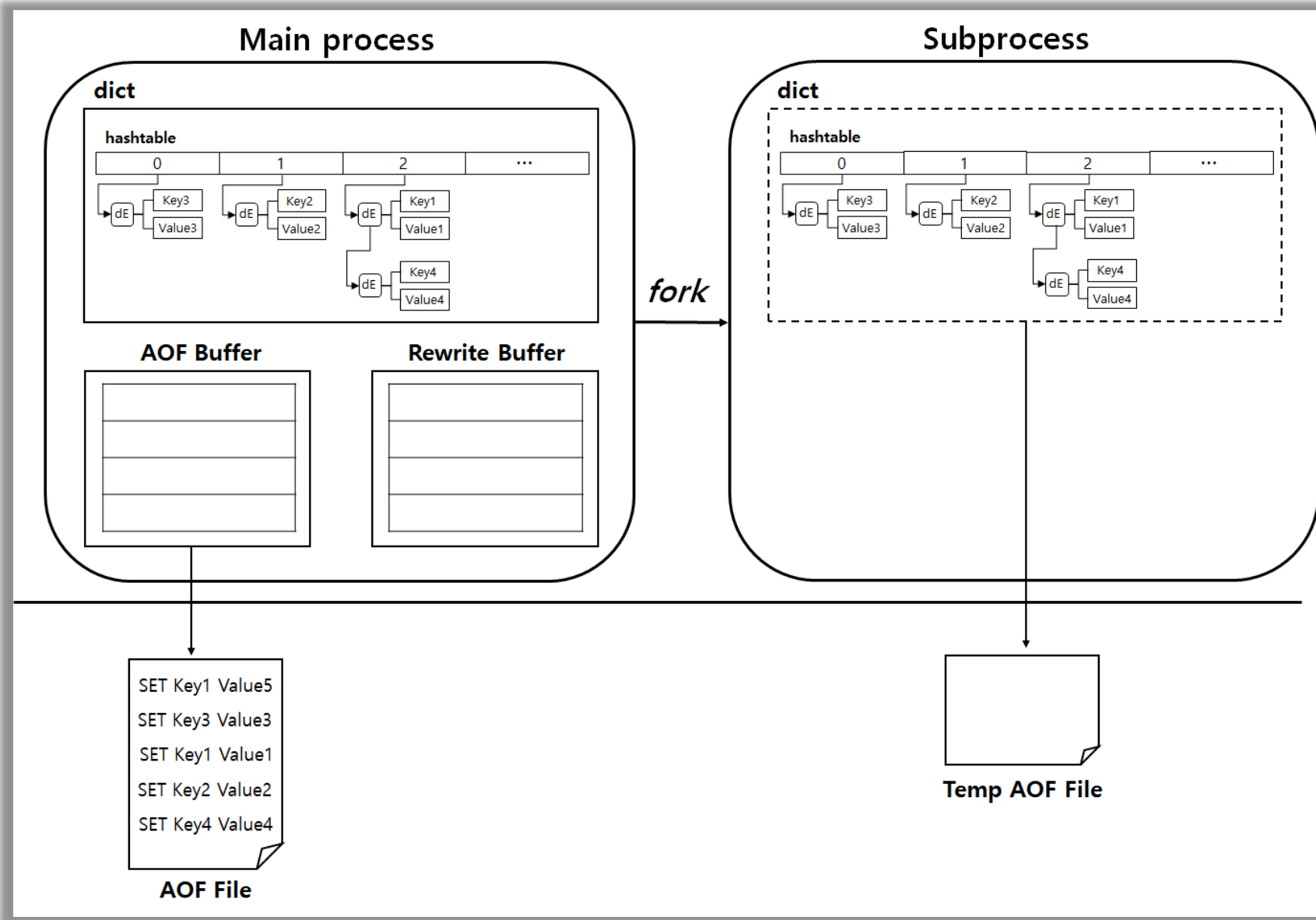
└ AOF Rewrite



01

Background

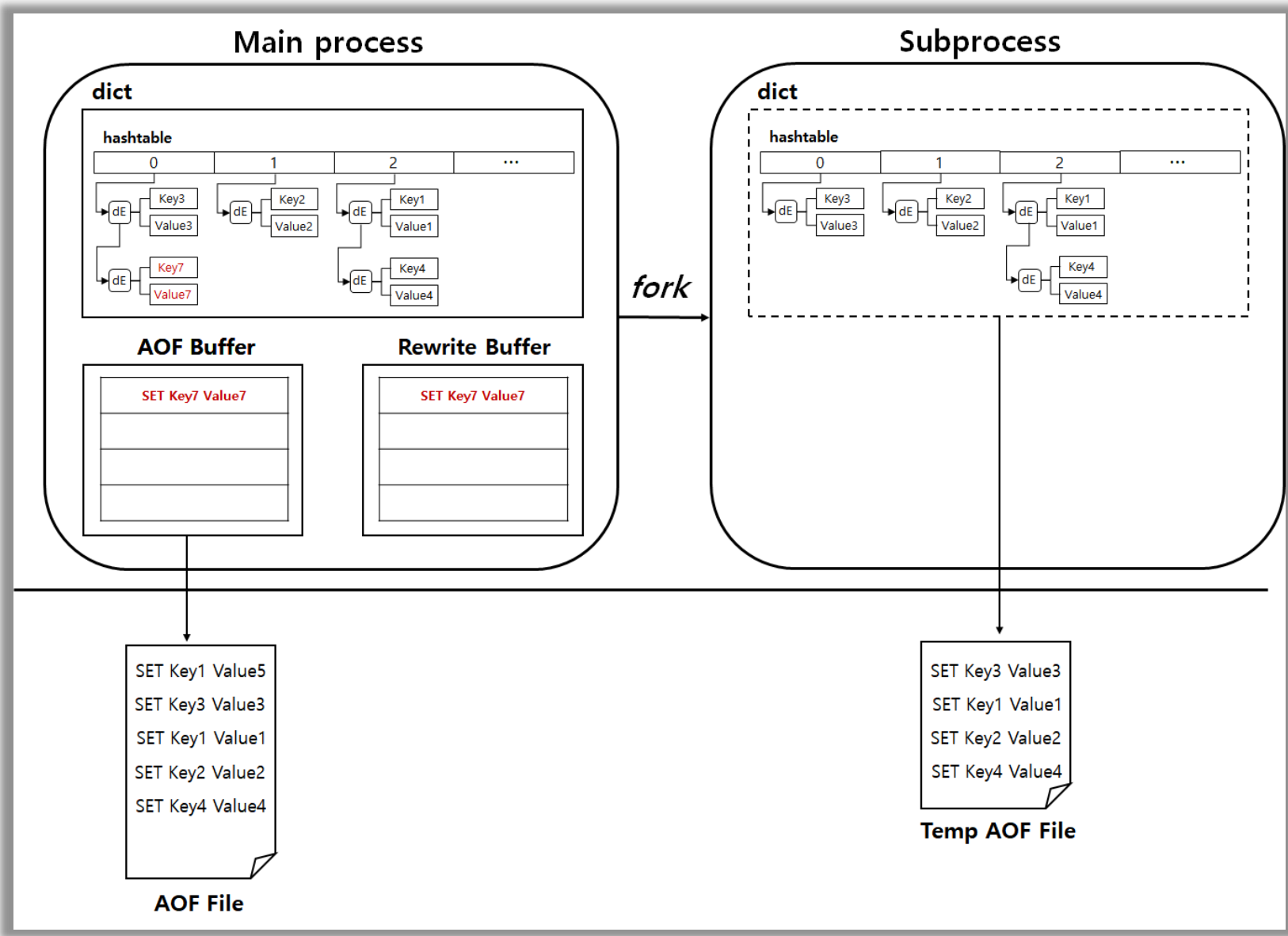
└ AOF Rewrite



01

Background

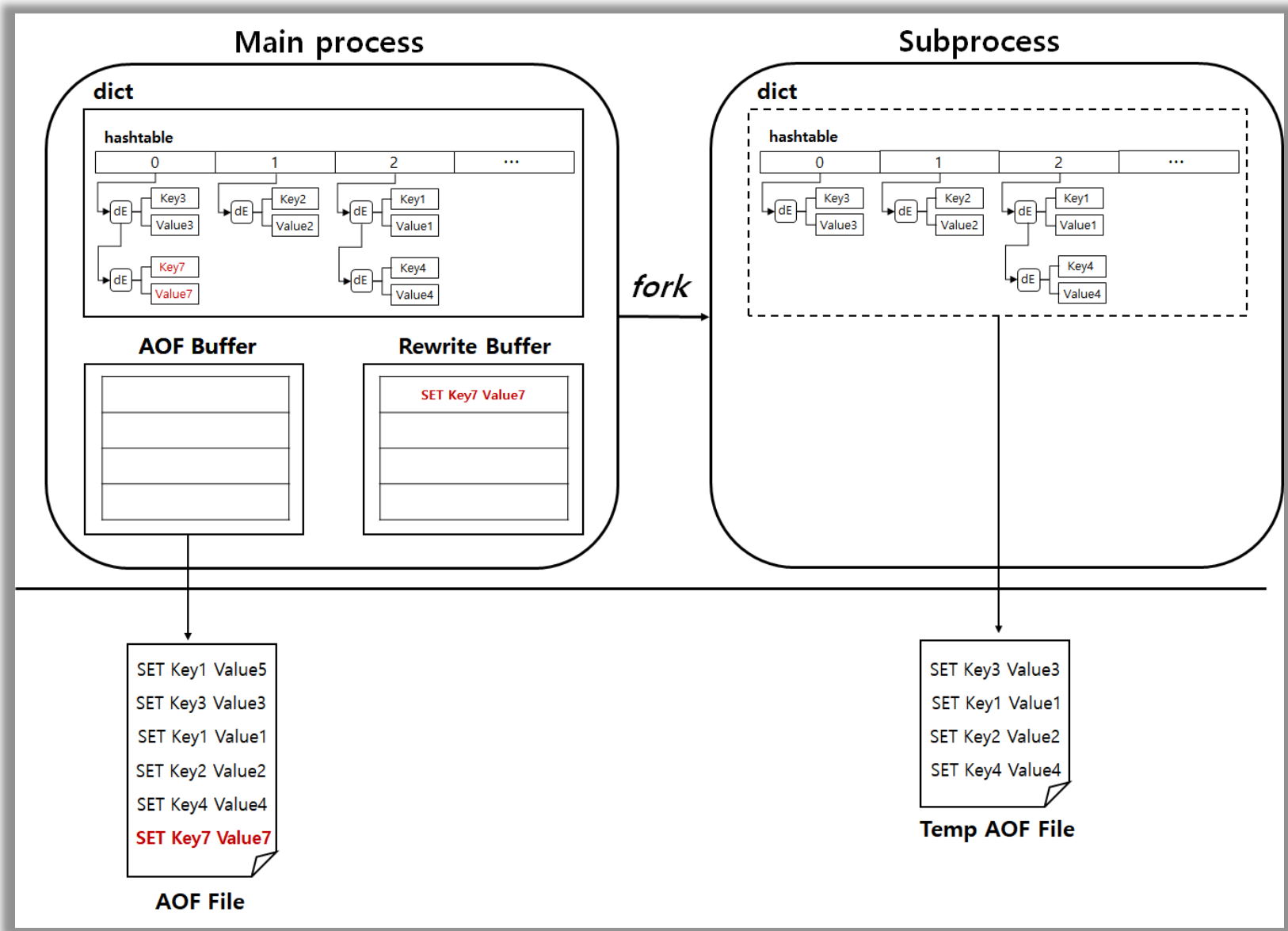
└ AOF Rewrite



01

Background

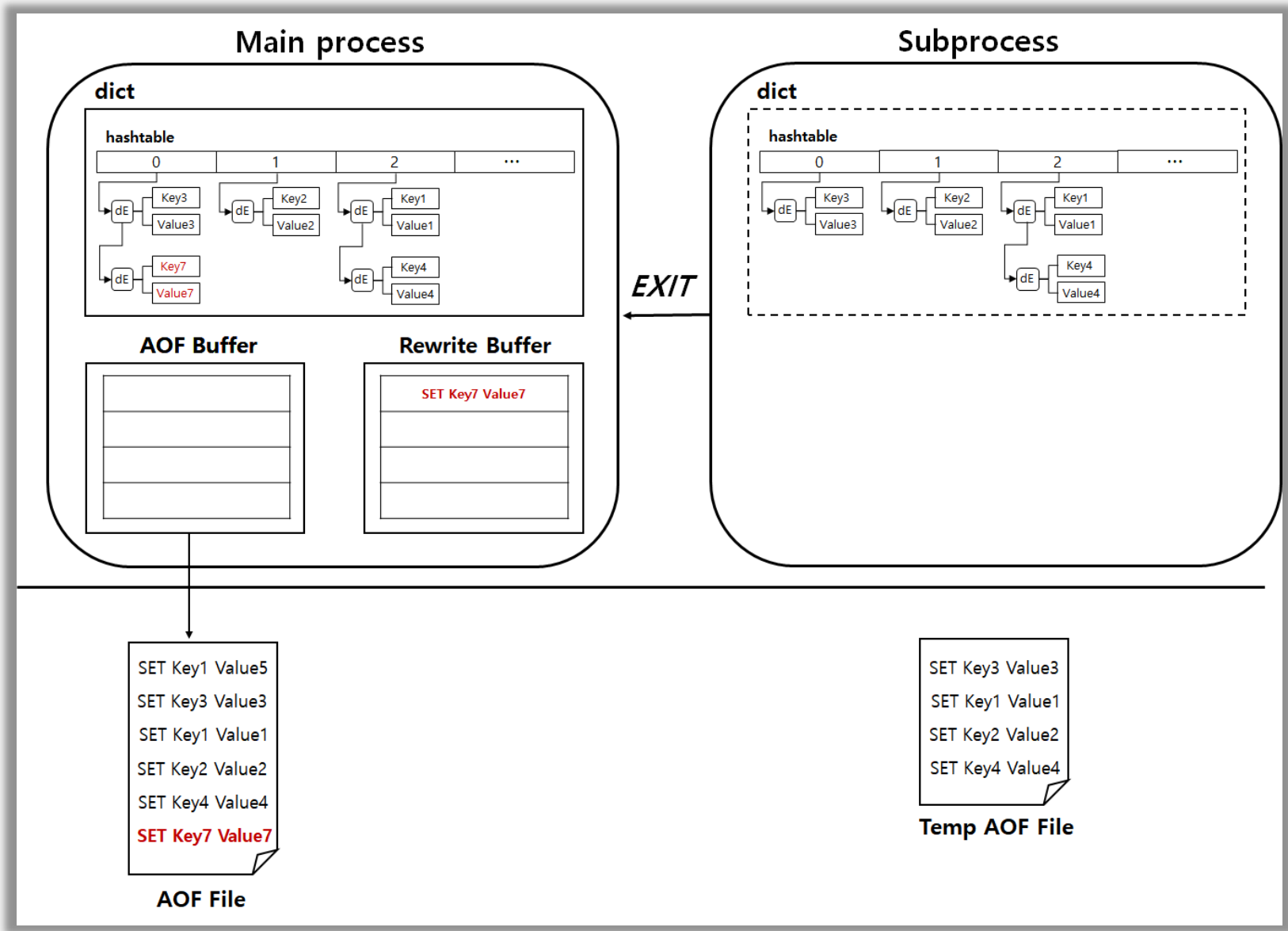
└ AOF Rewrite



01

Background

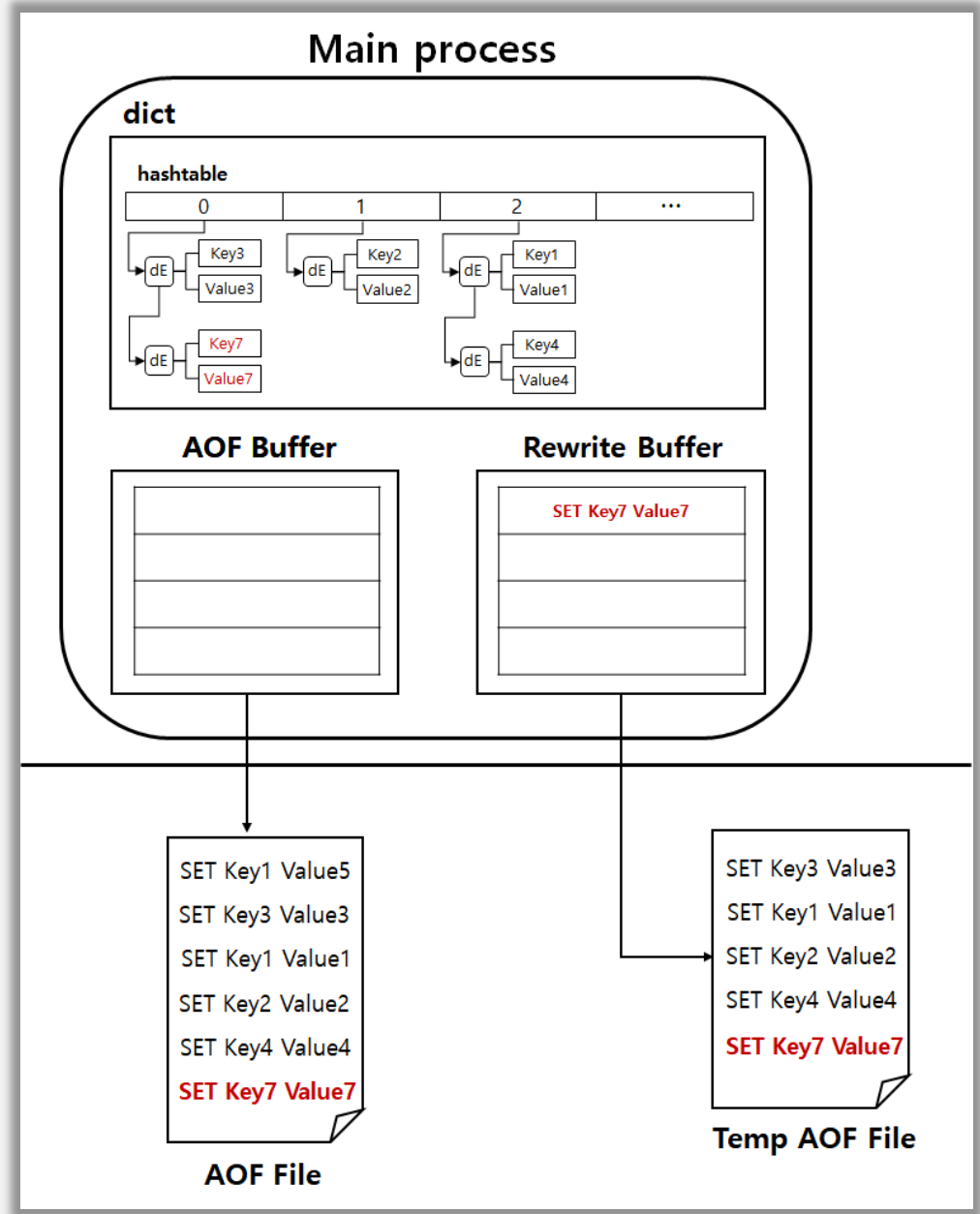
└ AOF Rewrite

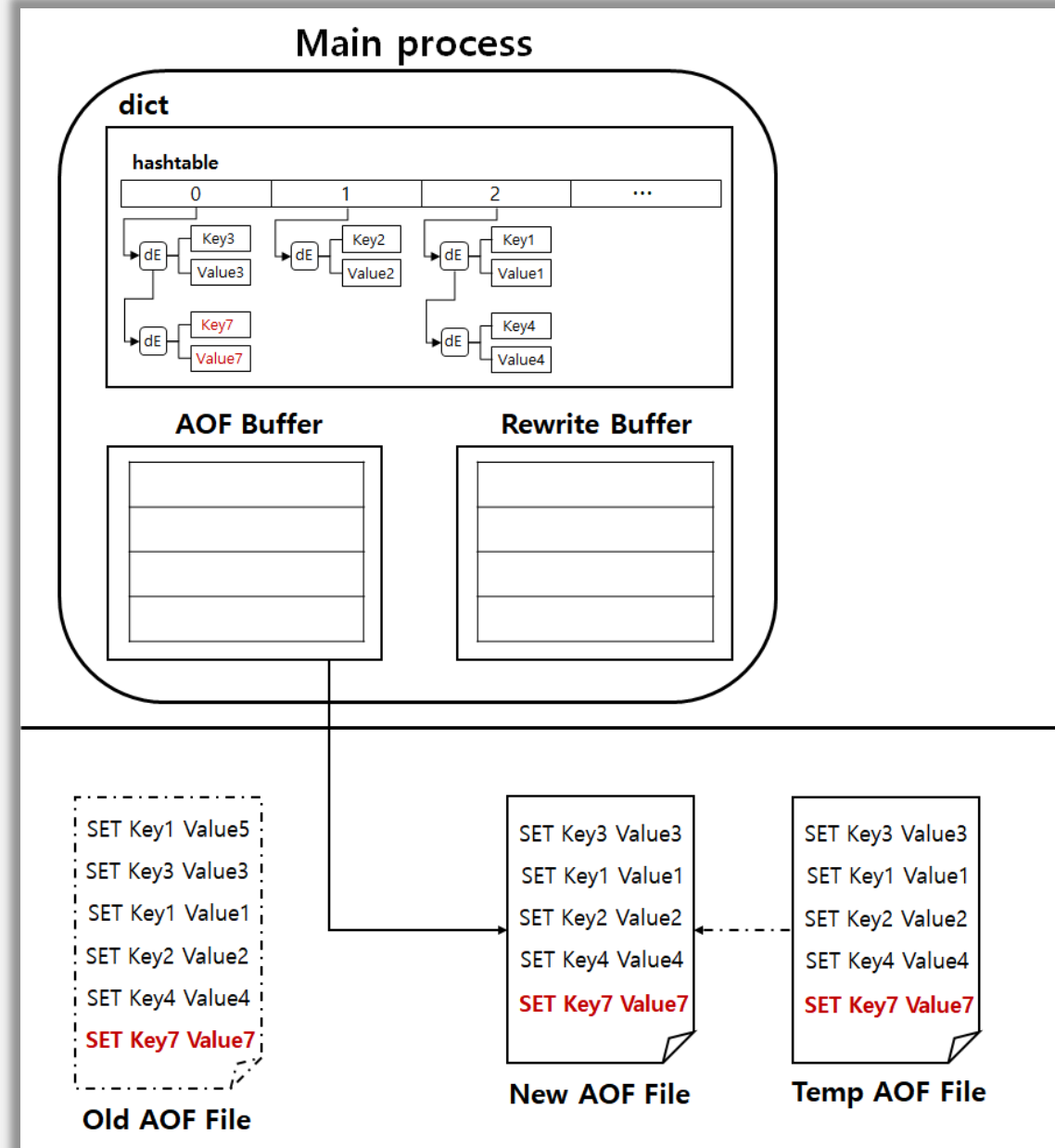


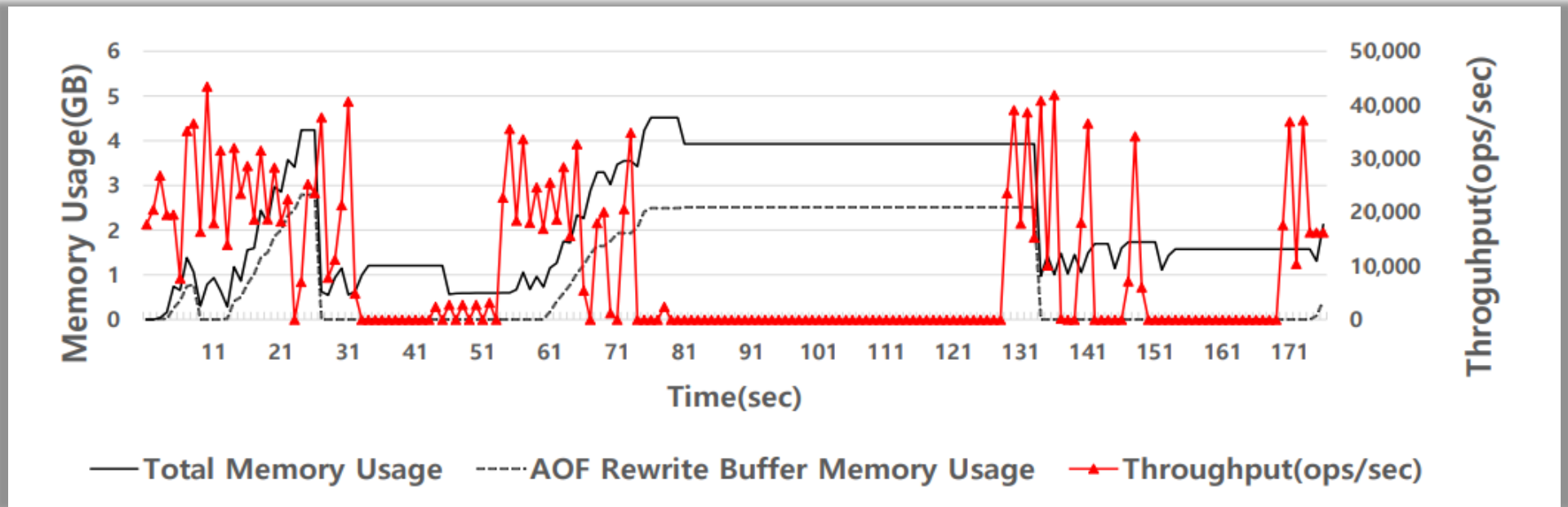
01

Background

└ AOF Rewrite







- **Memory Overhead 증가**
 - AOF Rewrite Trigger 시 요청된 데이터는 AOF 버퍼와 Rewrite 버퍼에 저장됨
- **Throughput 저하**
 - Main process가 flush 작업을 하는 동안 요청된 request들은 수행이 지연됨
- Child Process의 작업을 병렬로 수행하여 성능 향상 → **Parallel AOF Method**



목차

01 Background

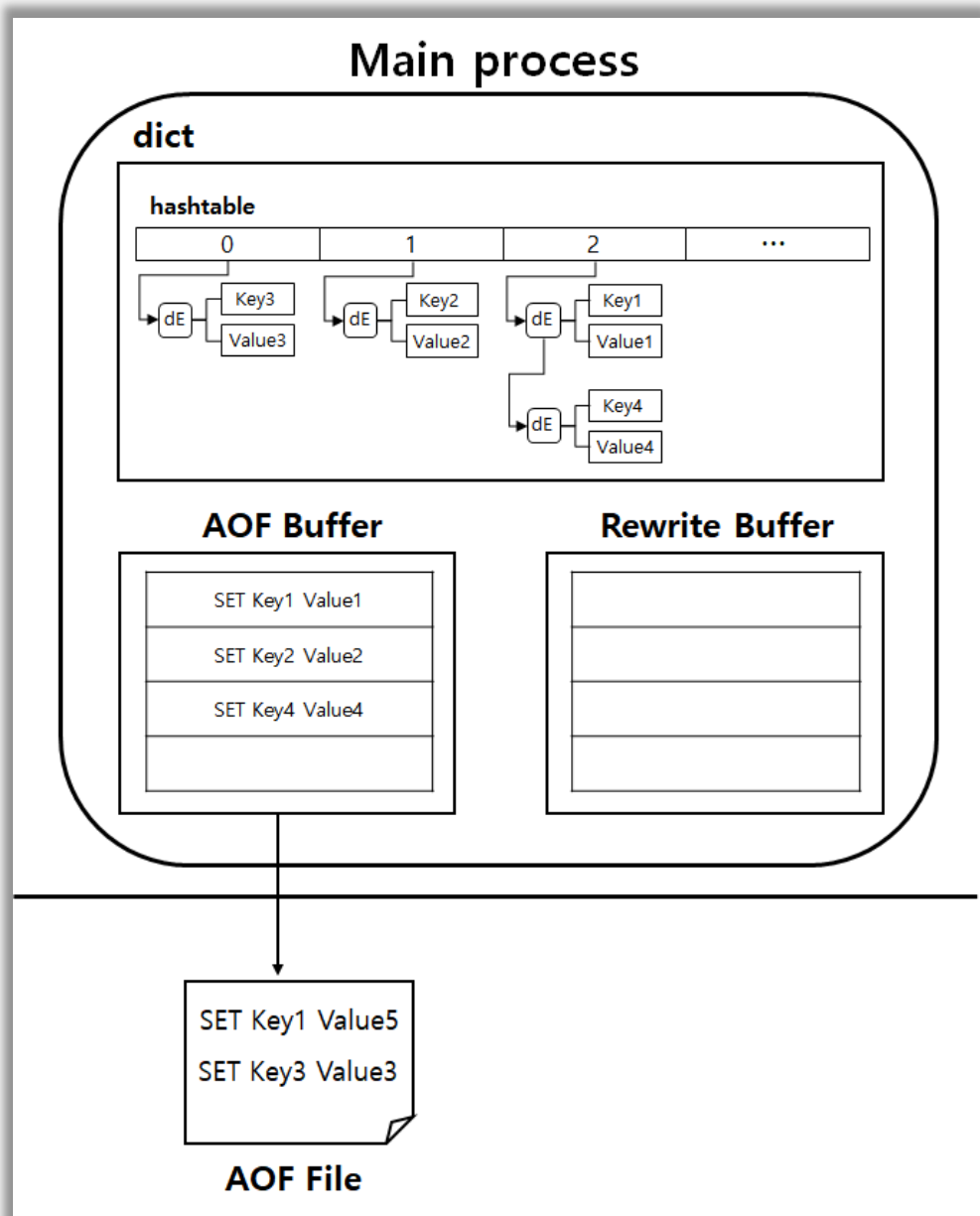
02 PAOF Logging Process

03 PAOF Recovery Process

04 Module Experiment

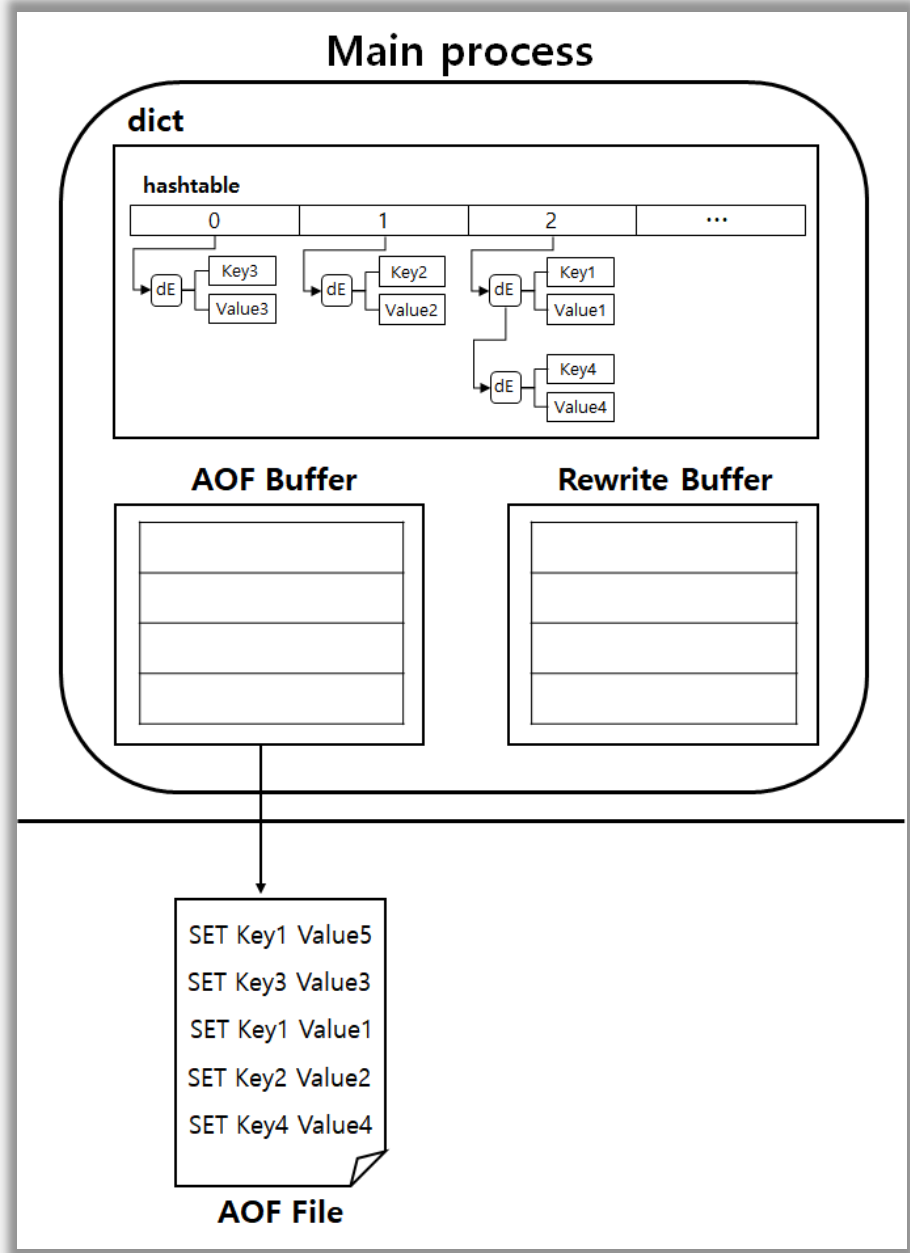
05 Plan

PAOF Logging Process

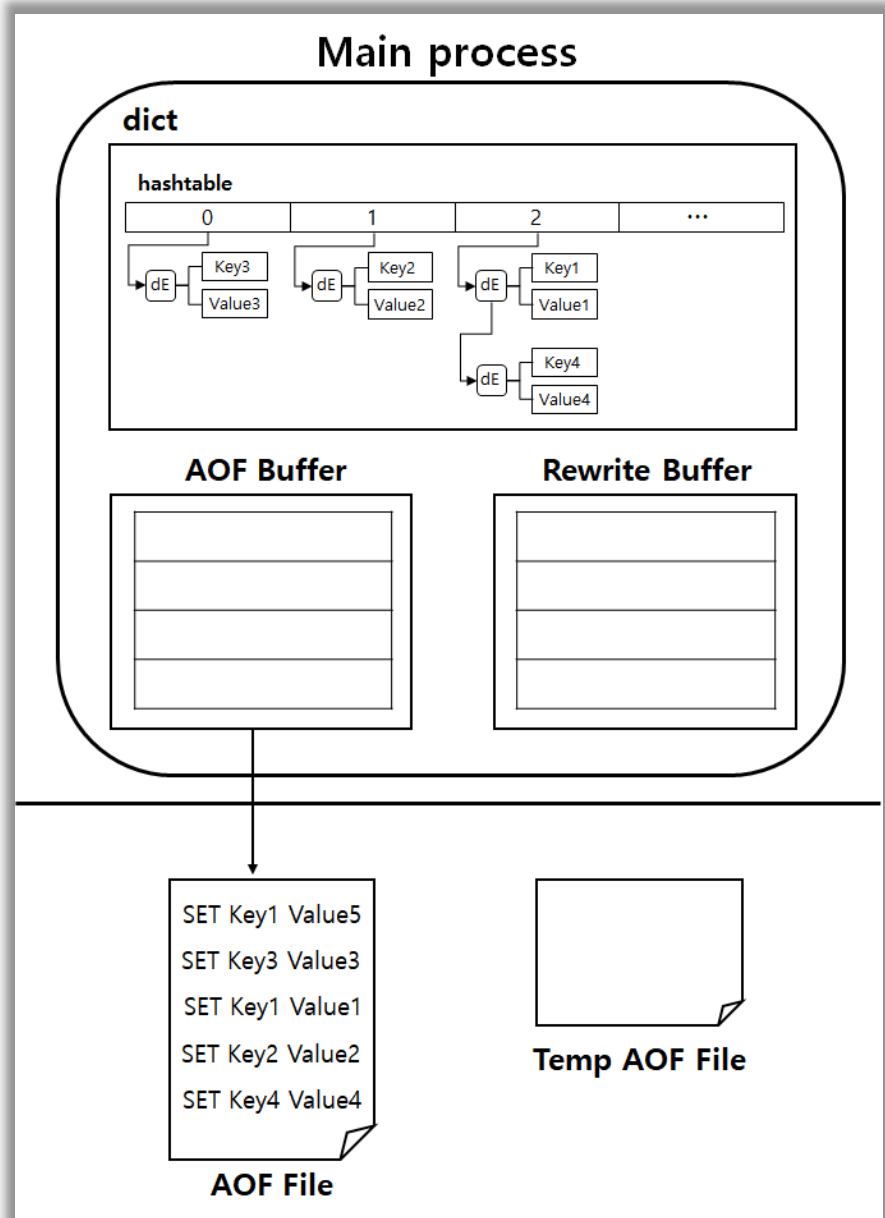


02

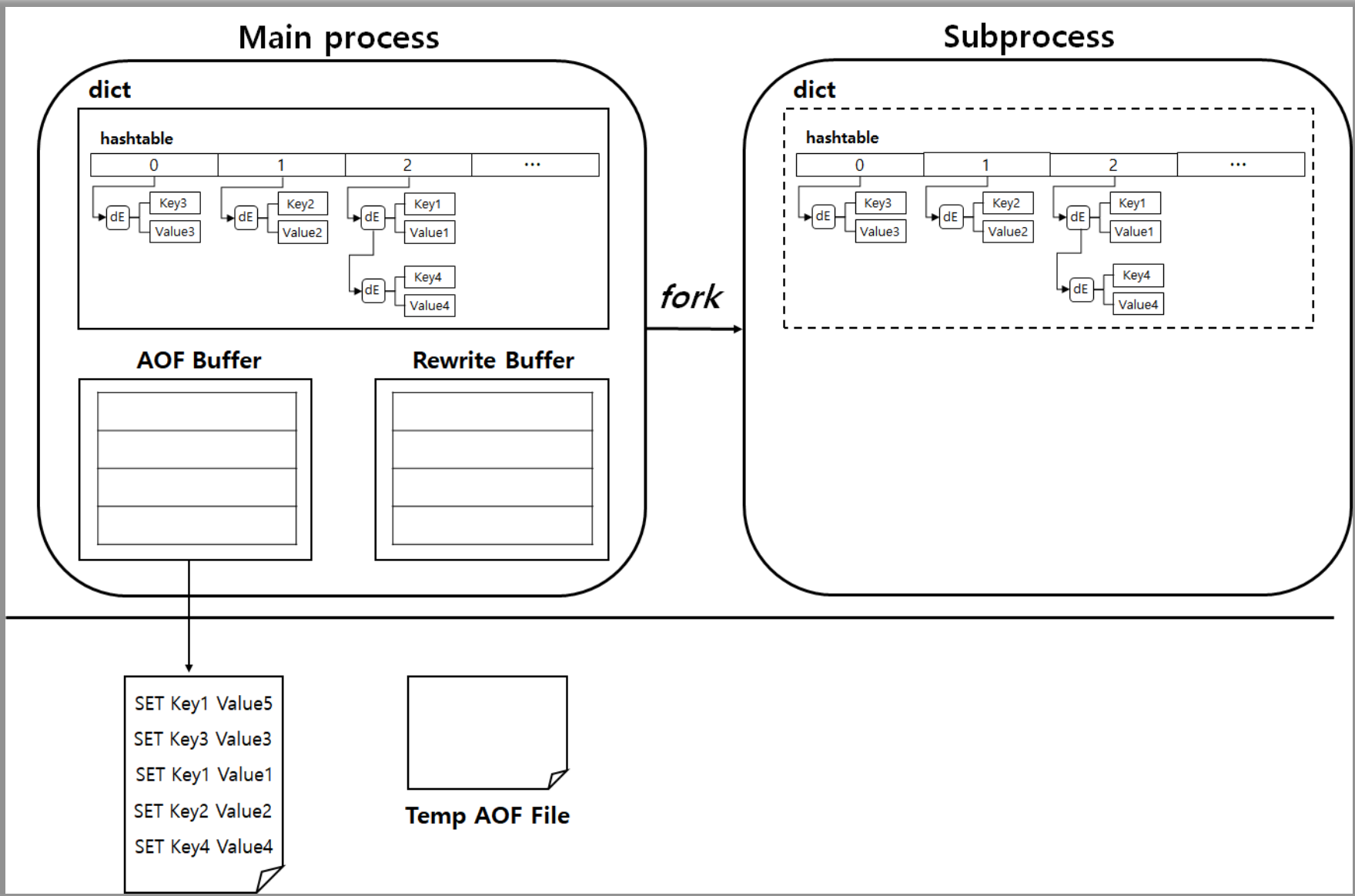
PAOF Logging Process



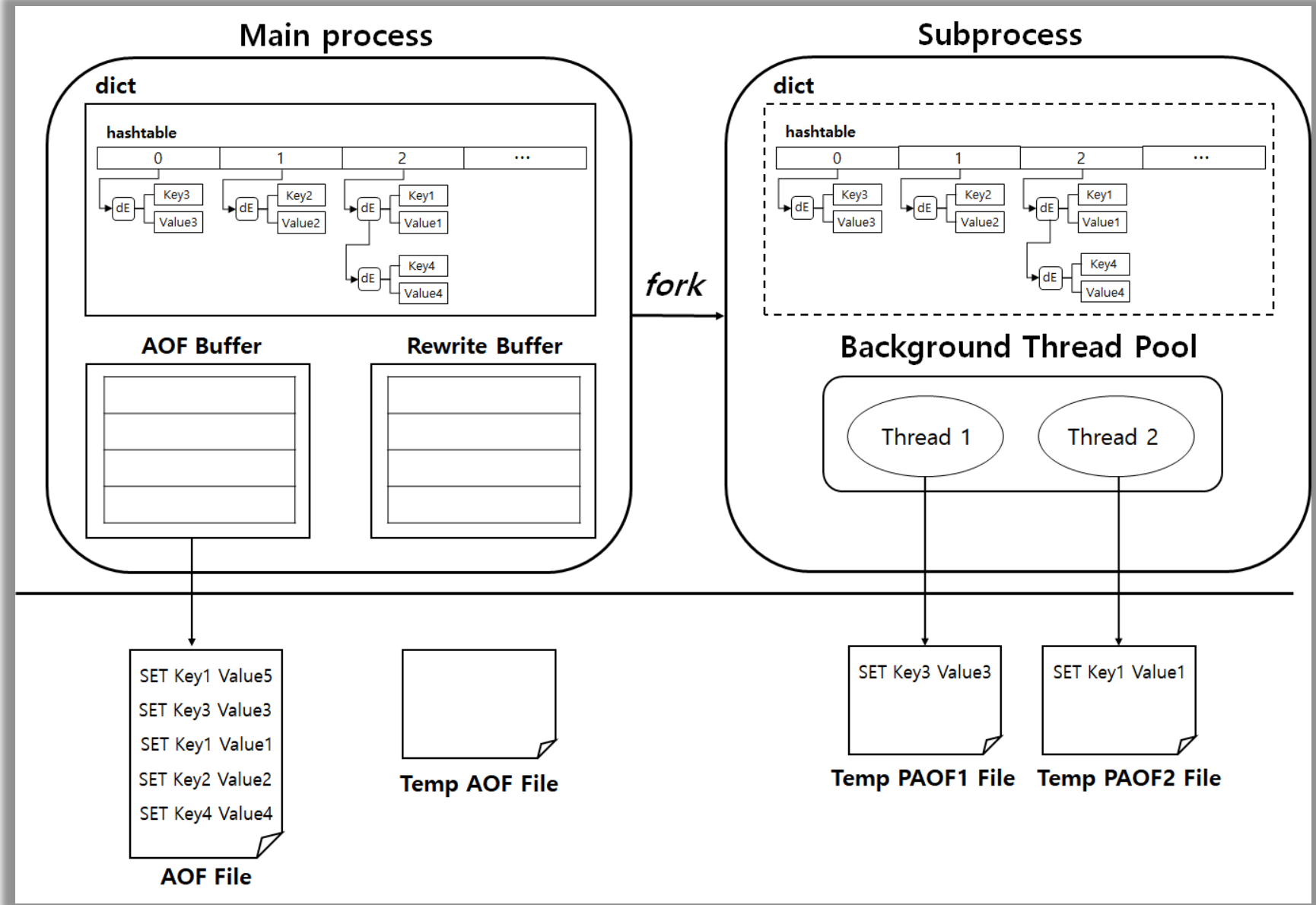
PAOF Logging Process



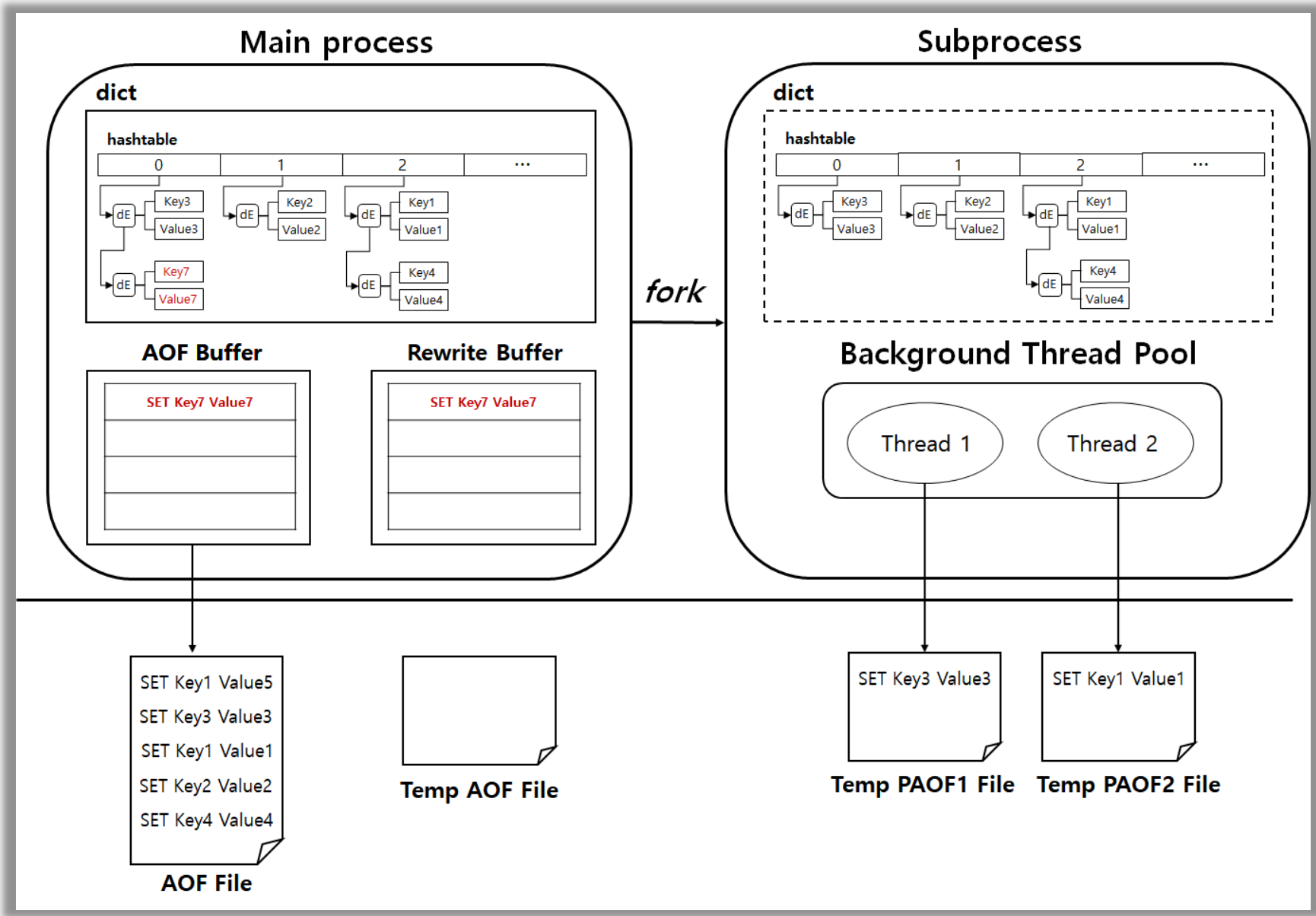
PAOF Logging Process



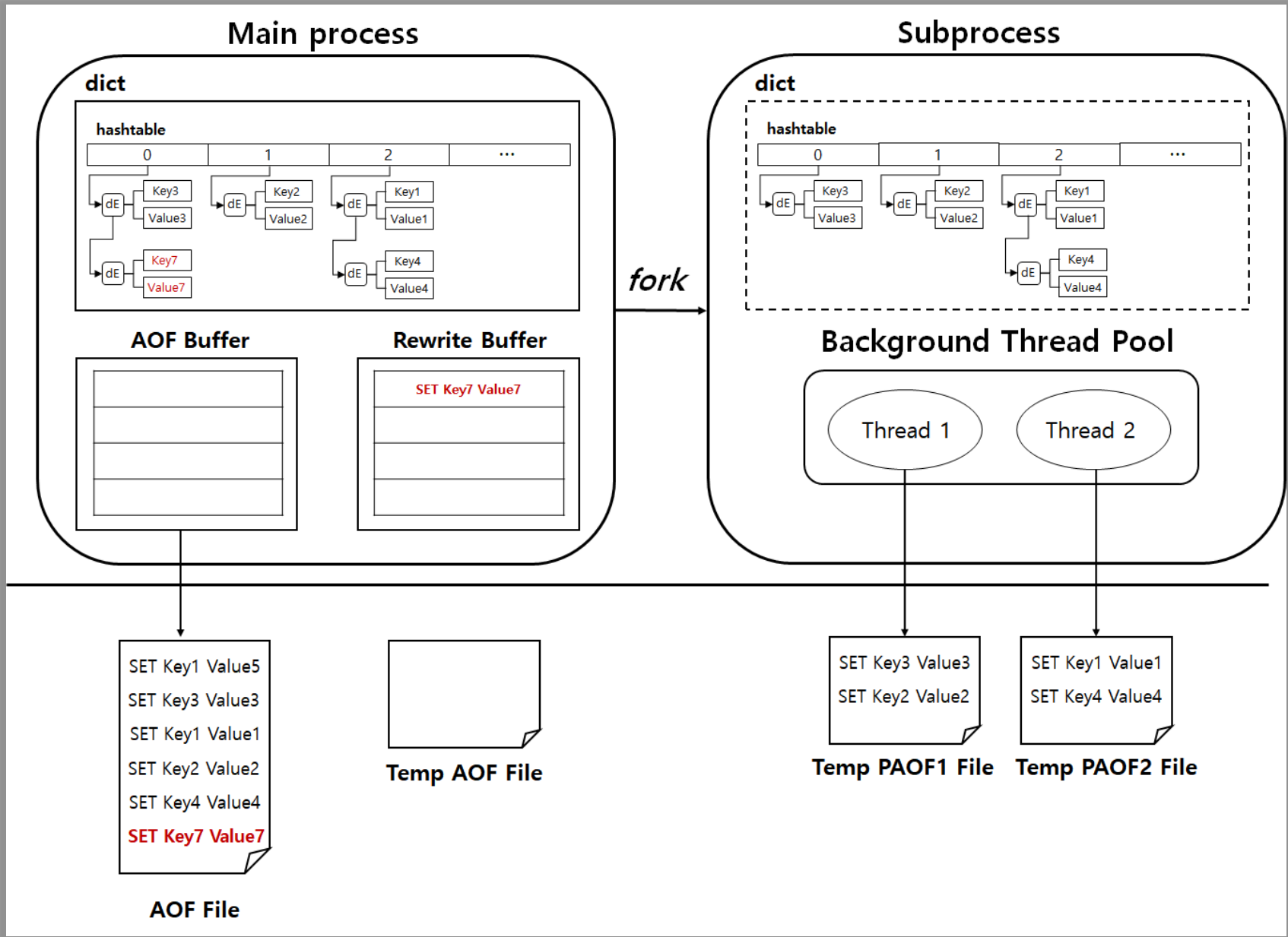
PAOF Logging Process



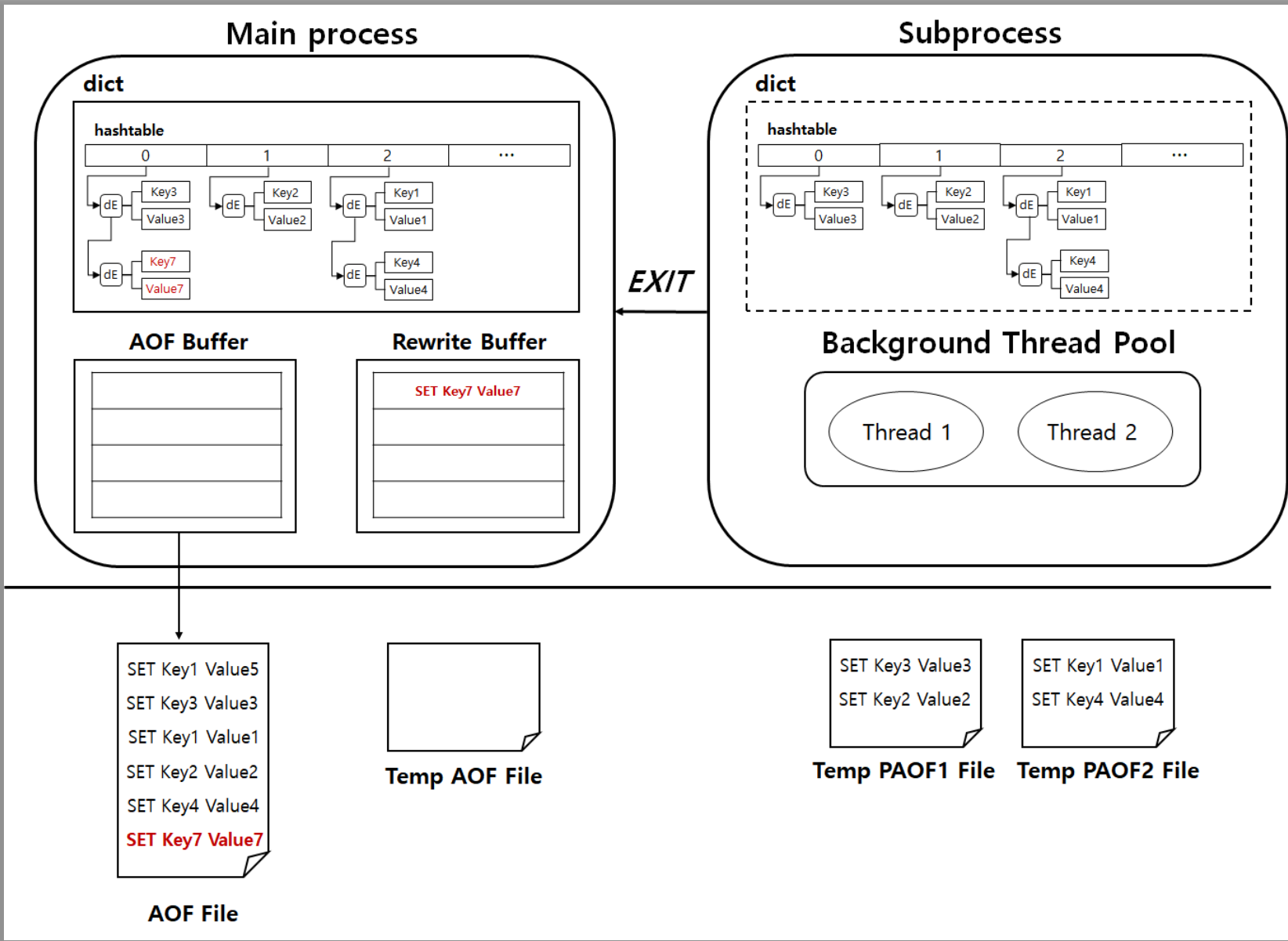
PAOF Logging Process



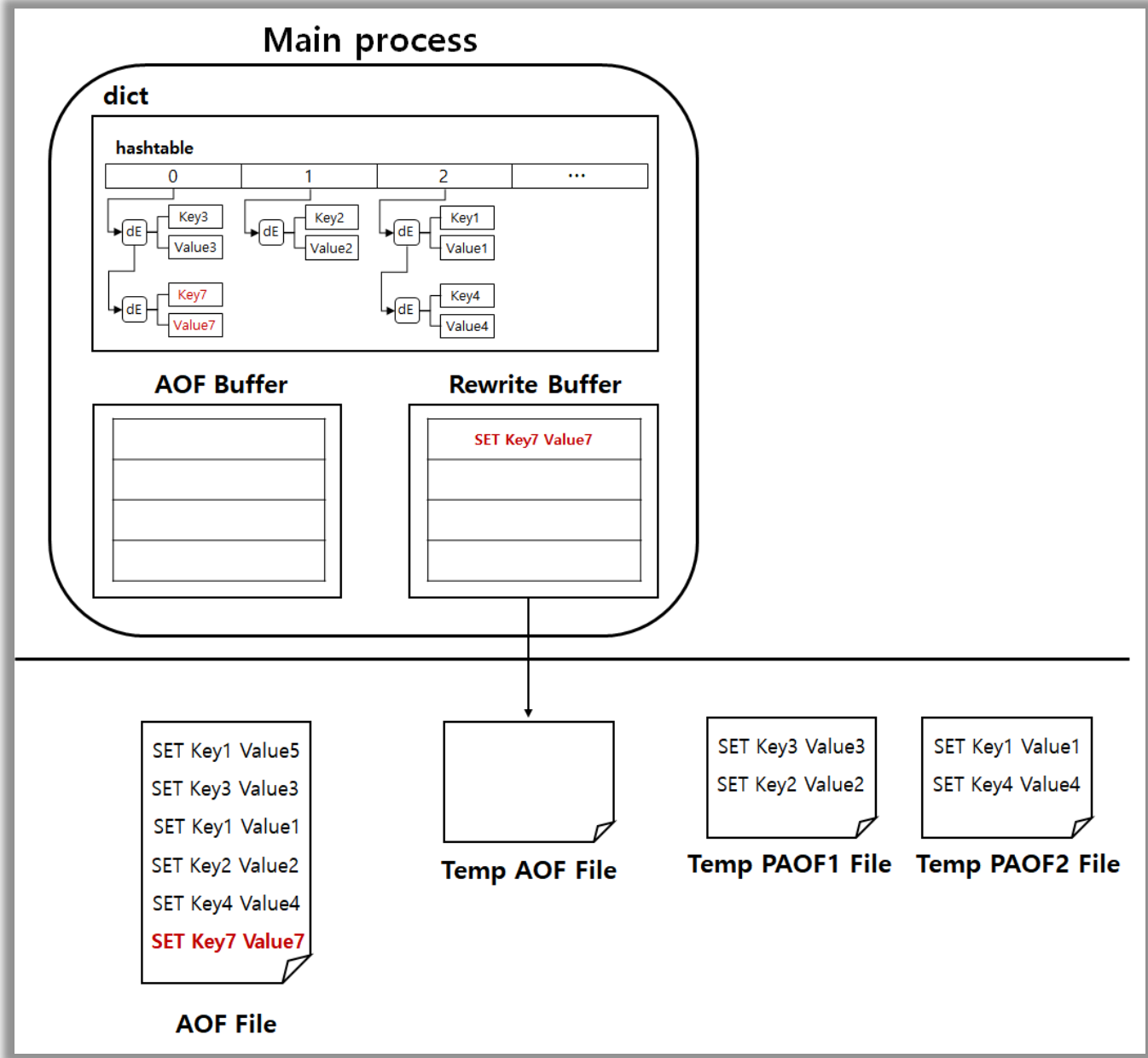
PAOF Logging Process



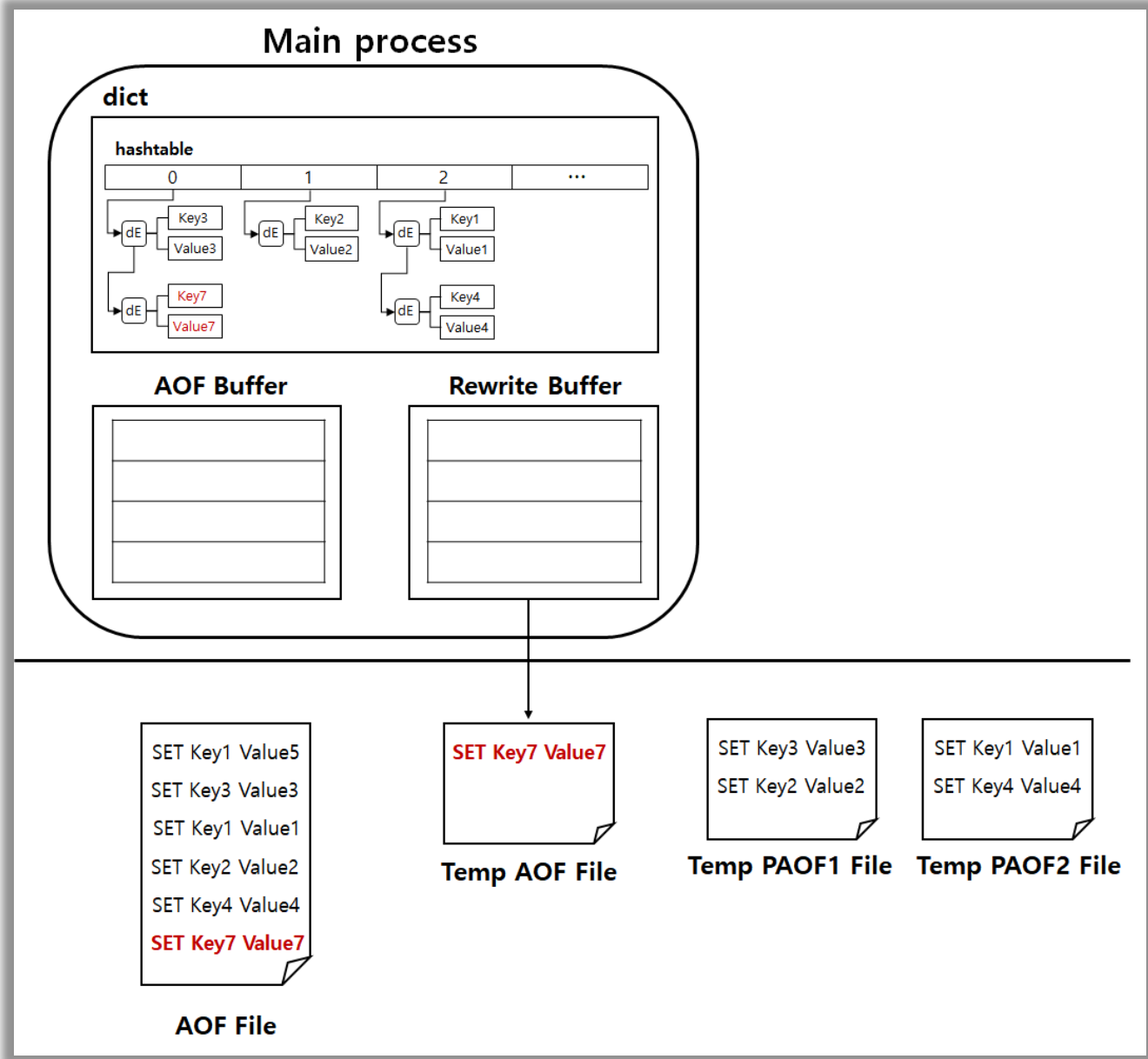
PAOF Logging Process



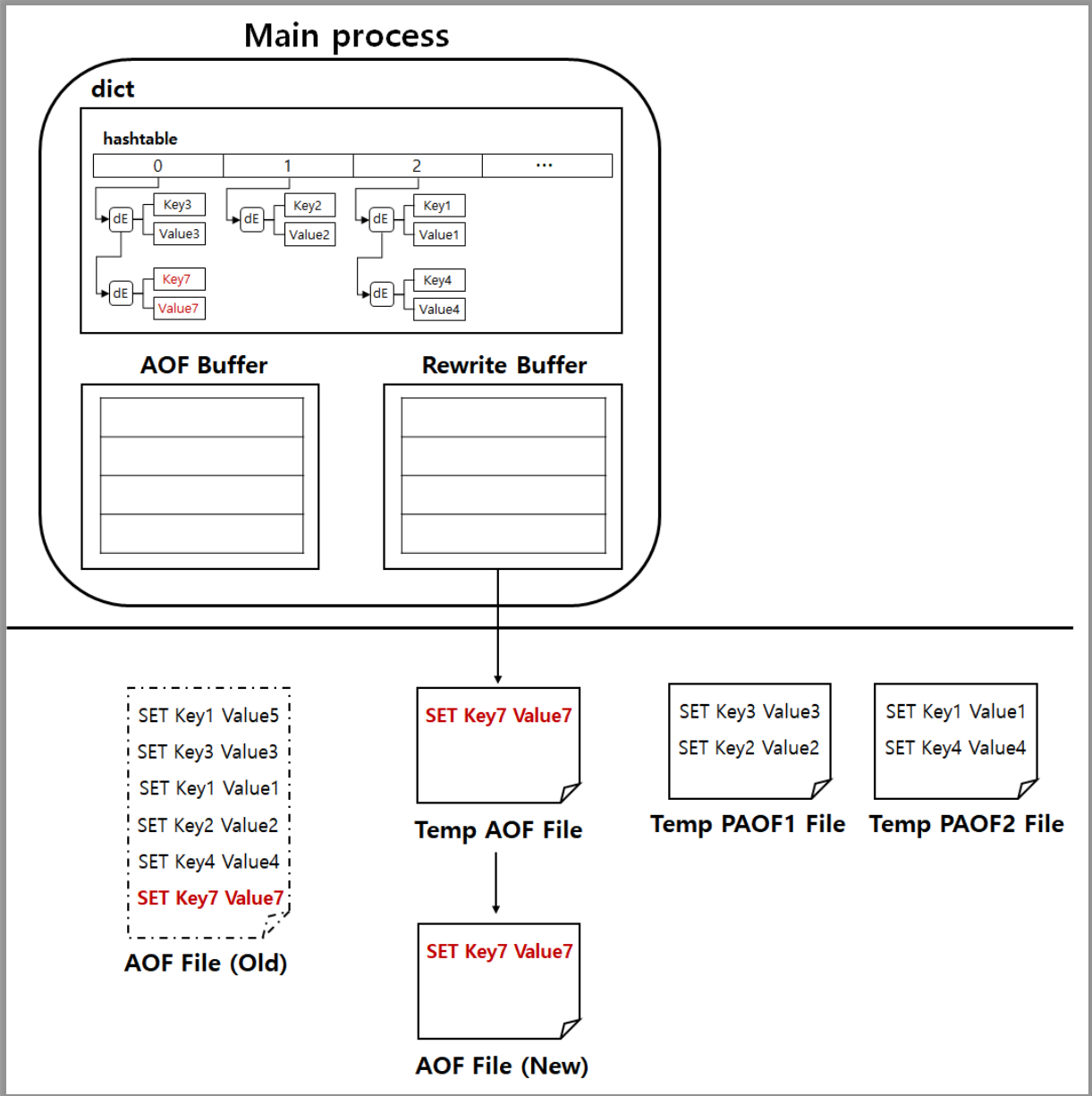
PAOF Logging Process



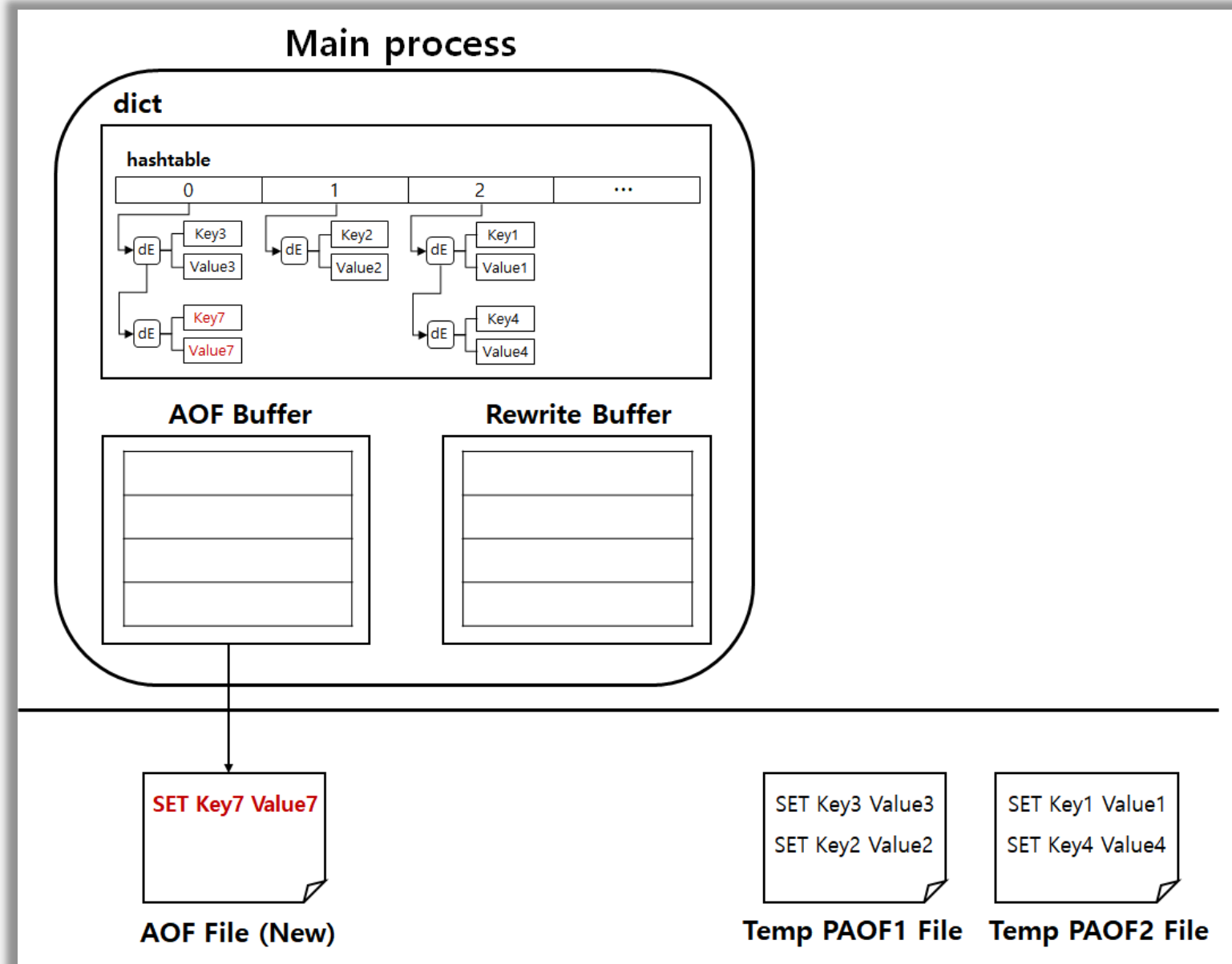
PAOF Logging Process



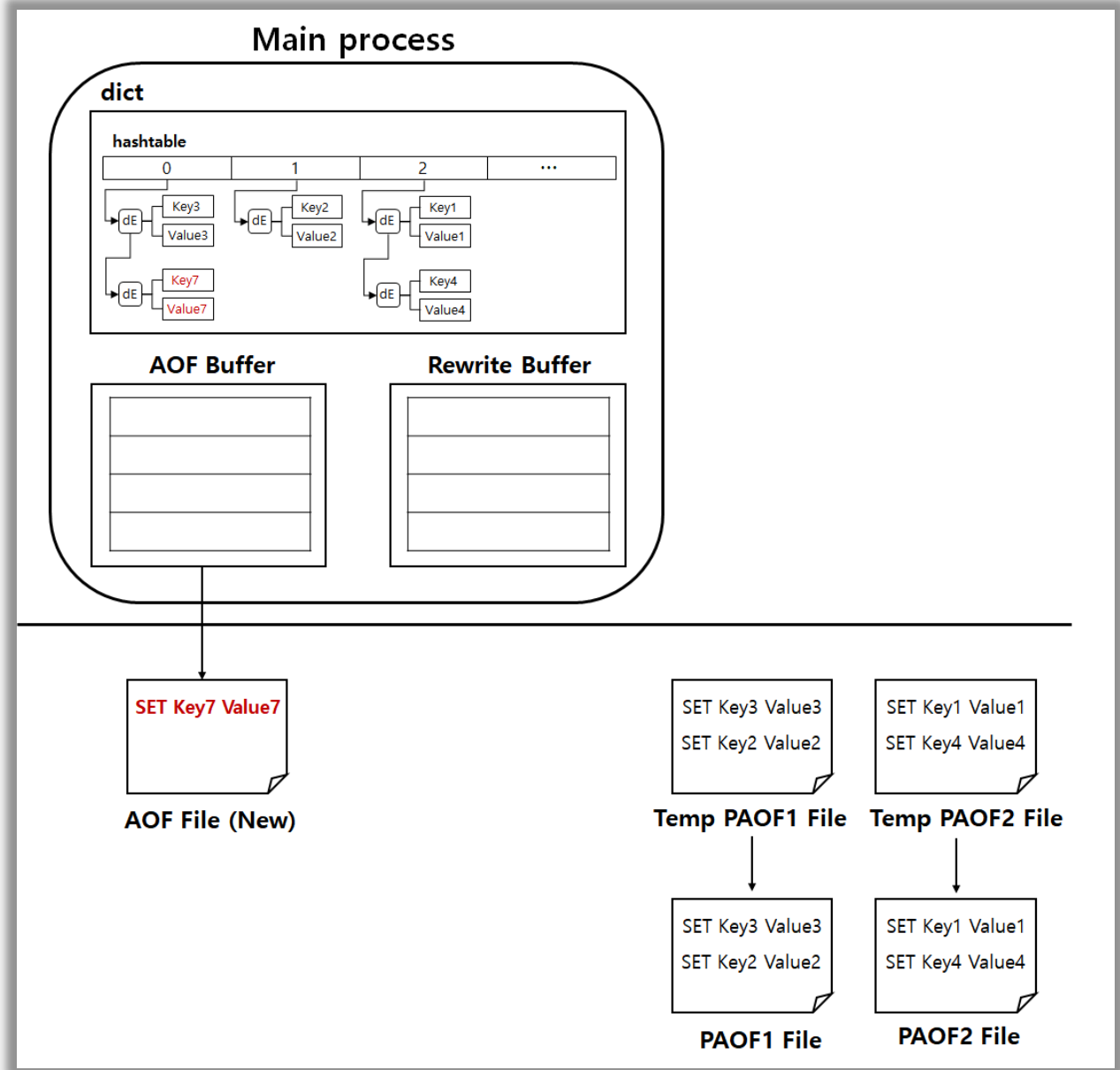
PAOF Logging Process



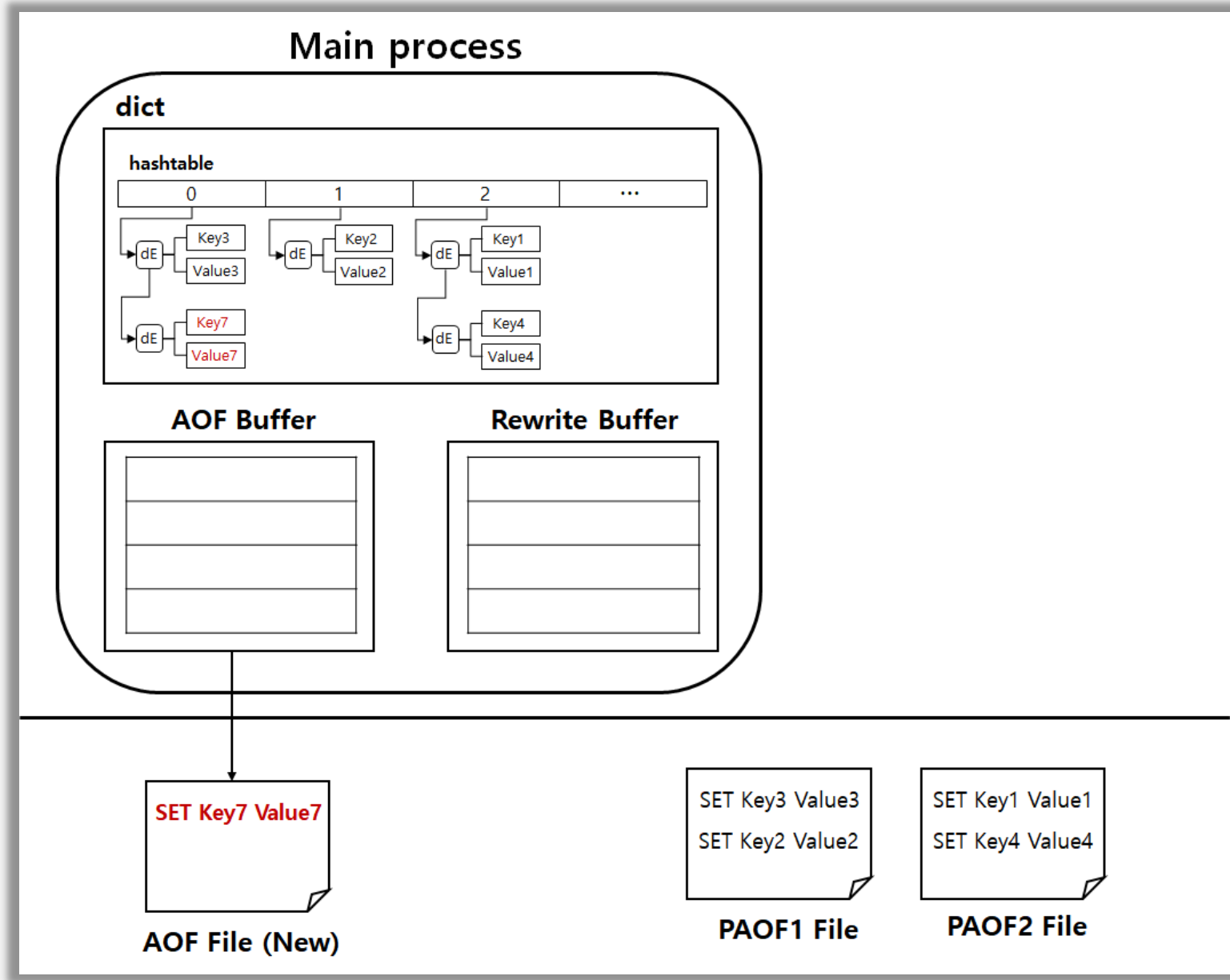
PAOF Logging Process



PAOF Logging Process



PAOF Logging Process





목차

01 Background

02 PAOF Logging Process

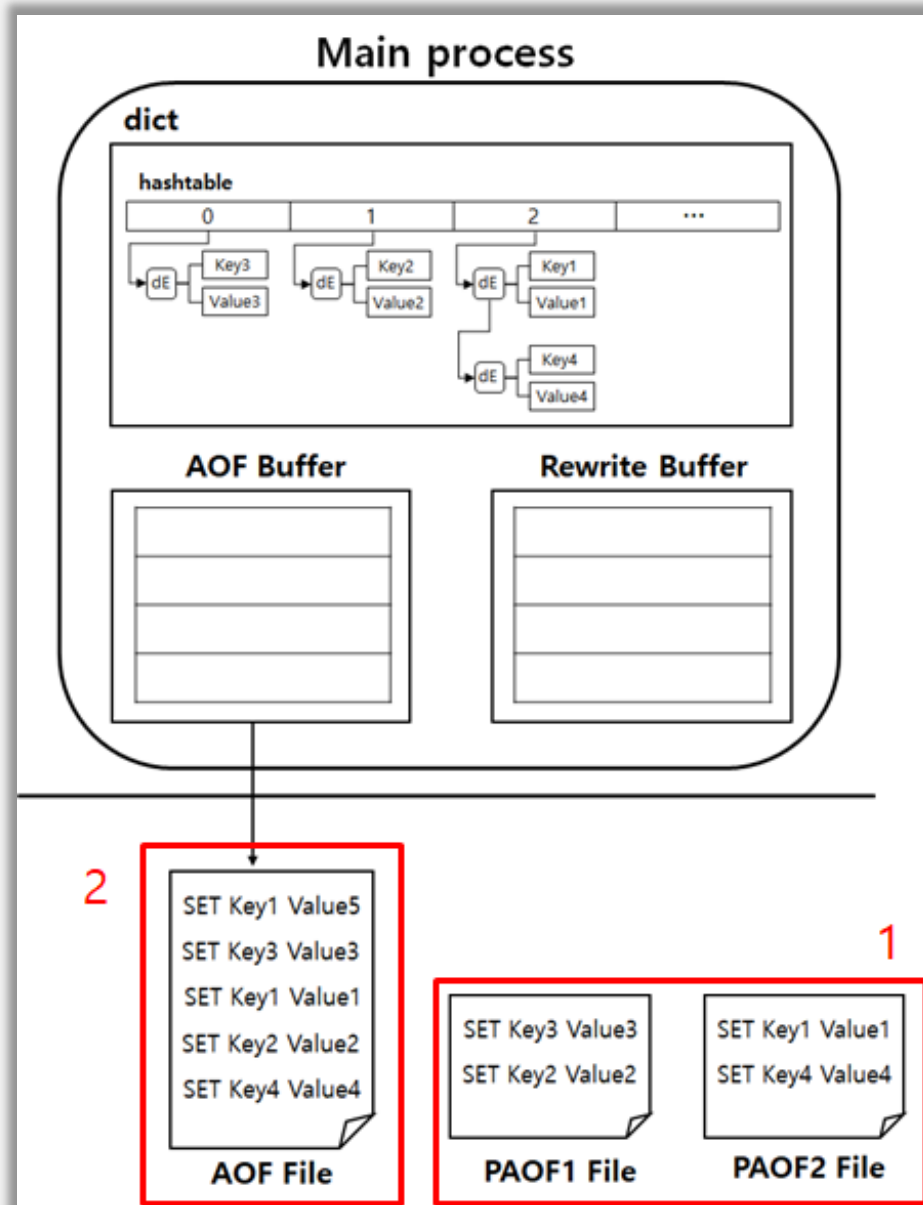
03 PAOF Recovery Process

04 Module Experiment

05 Plan

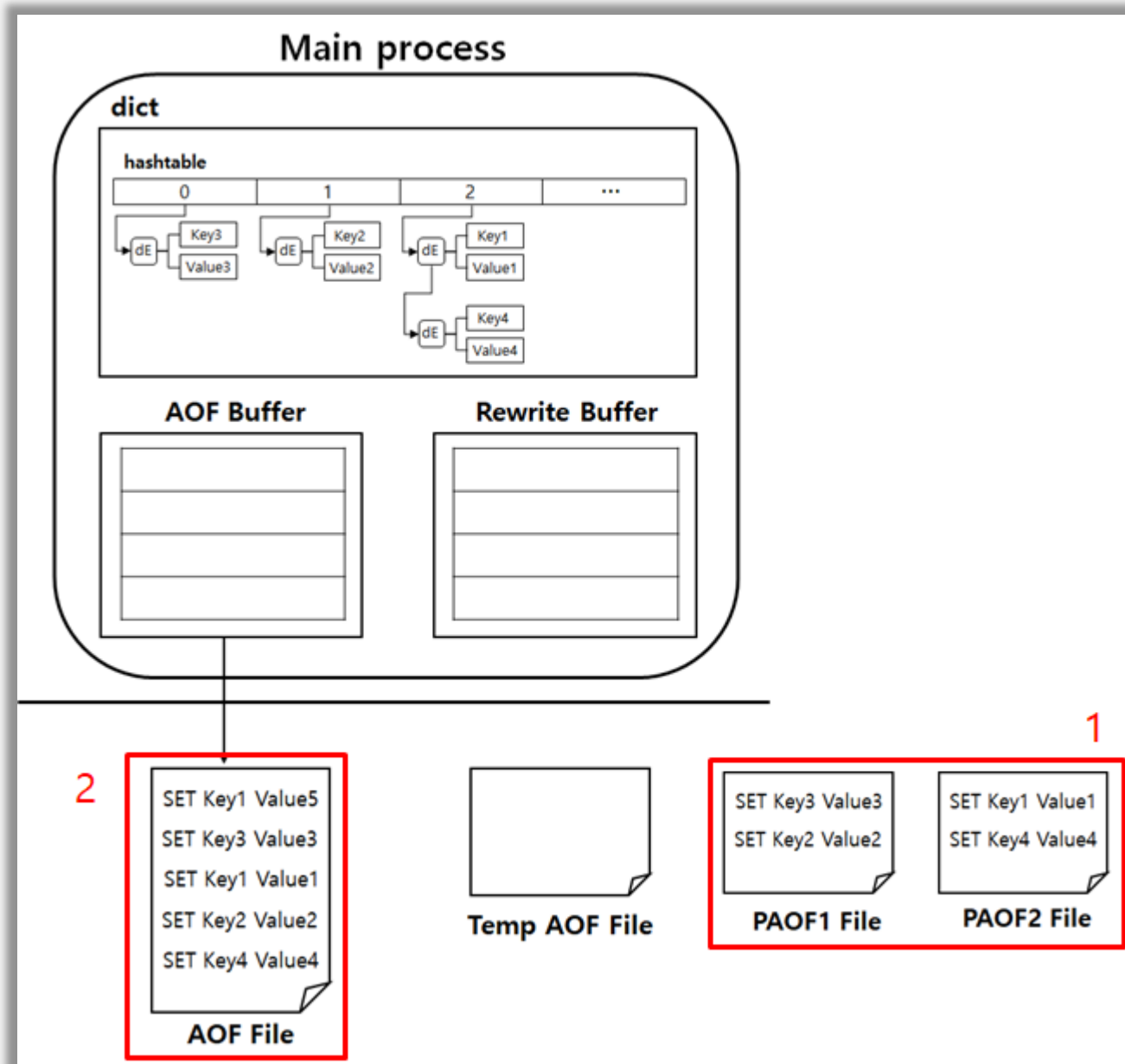
PAOF Recovery Process

└ Case 1



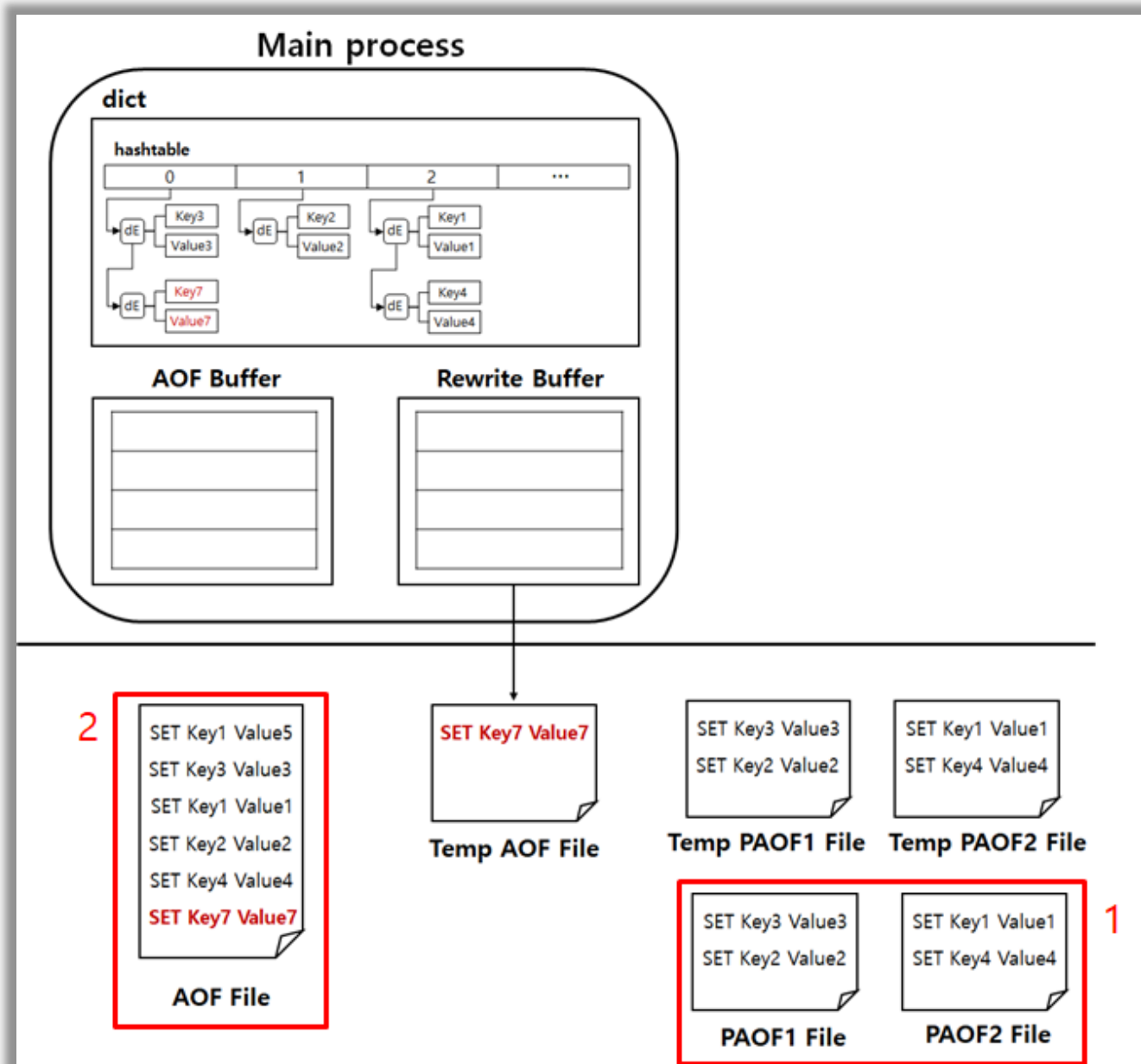
PAOF Recovery Process

└ Case 2



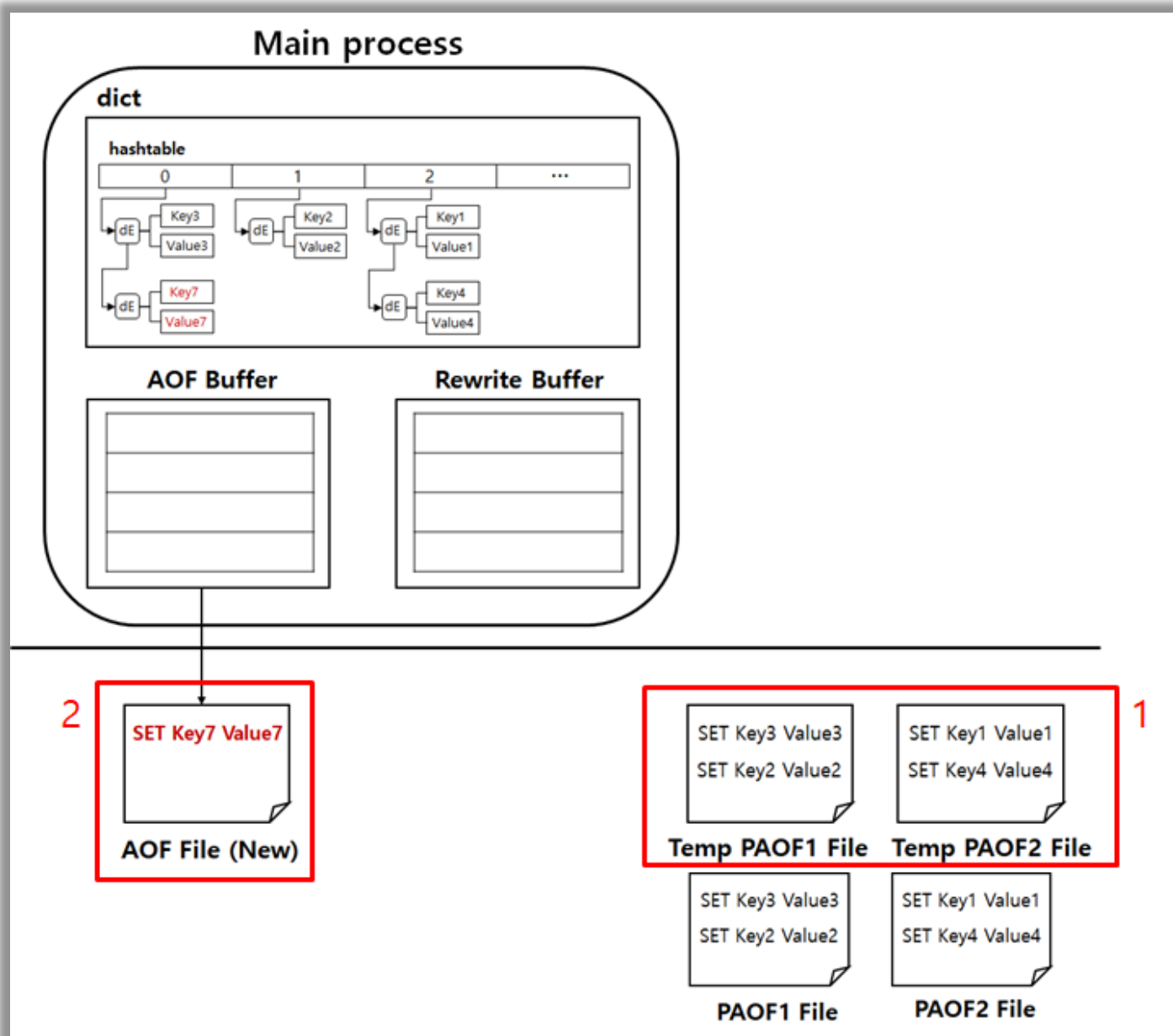
PAOF Recovery Process

└ Case 3



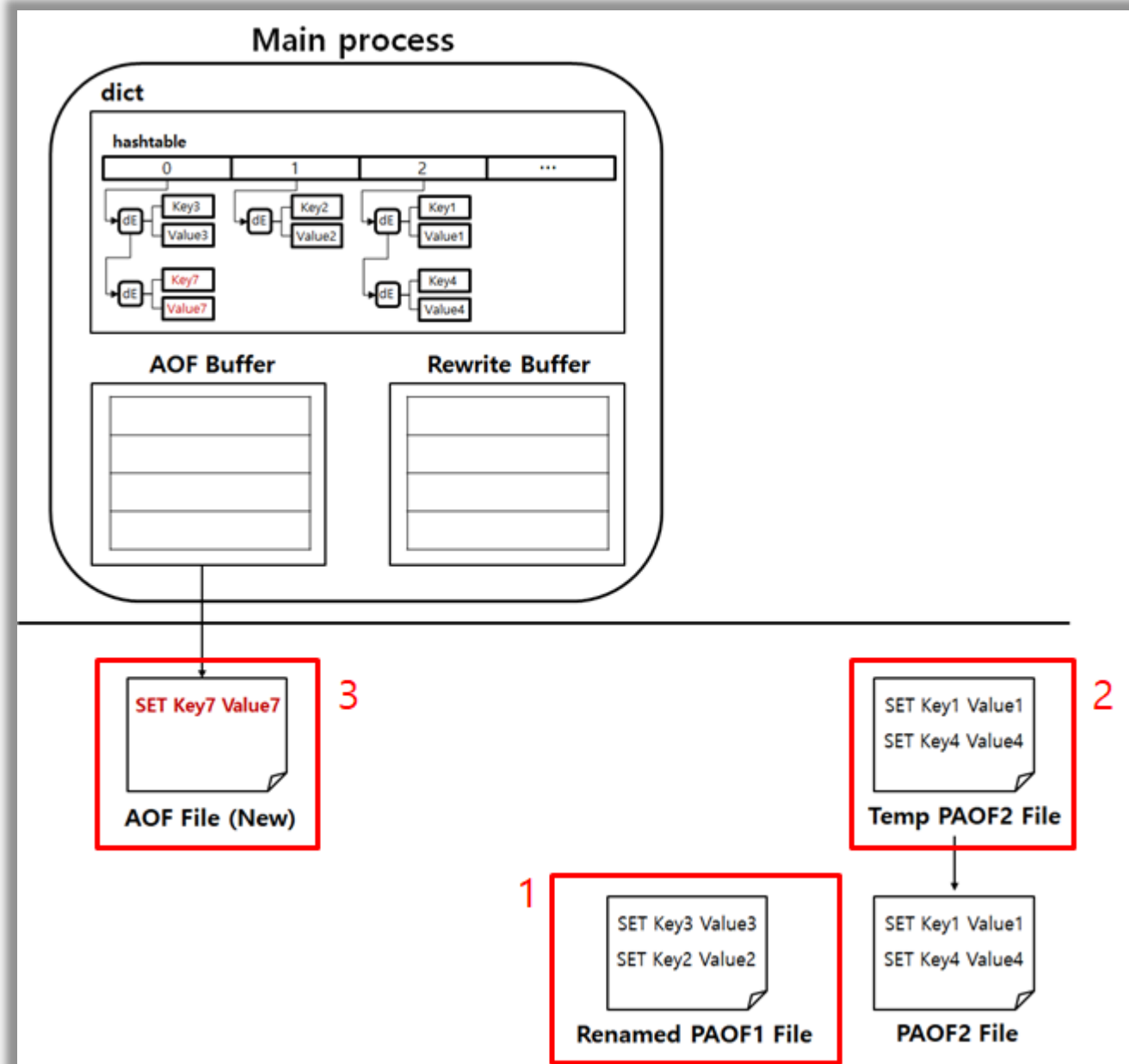
PAOF Recovery Process

└ Case 4



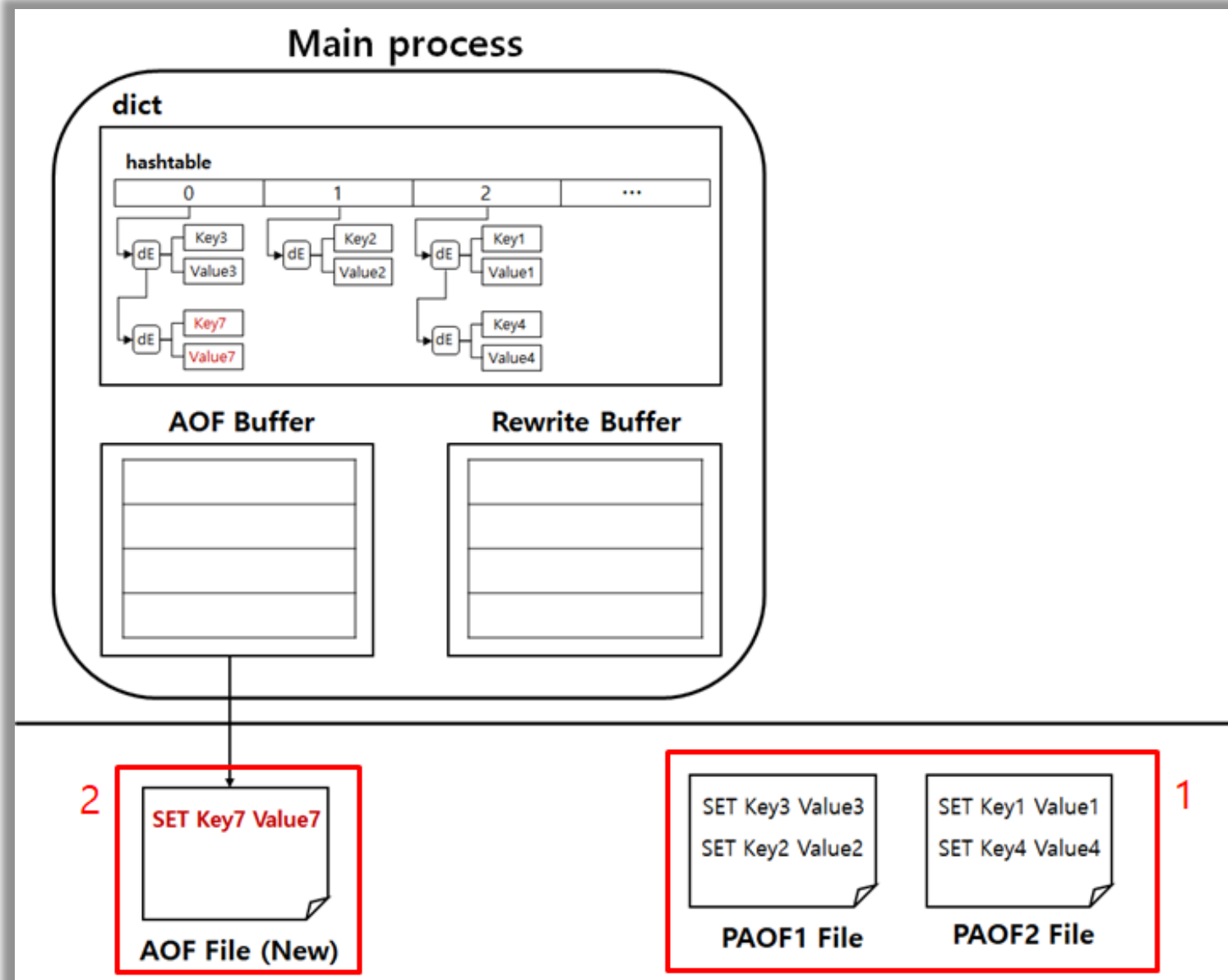
PAOF Recovery Process

└ Case 5



PAOF Recovery Process

└ Case 6





목차

01 Background

02 PAOF Logging Process

03 PAOF Recovery Process

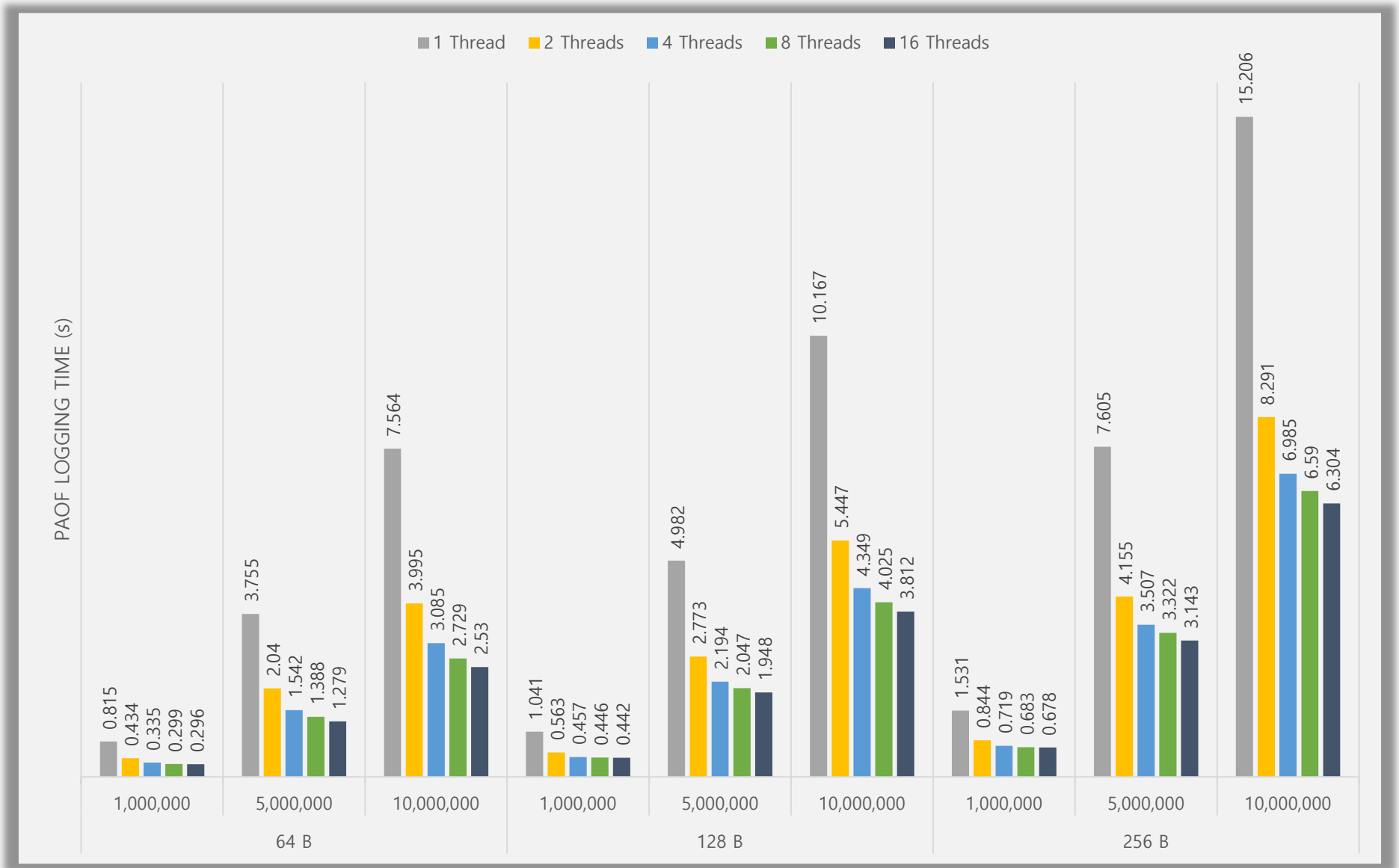
04 Module Experiment

05 Plan

04

Module Experiment

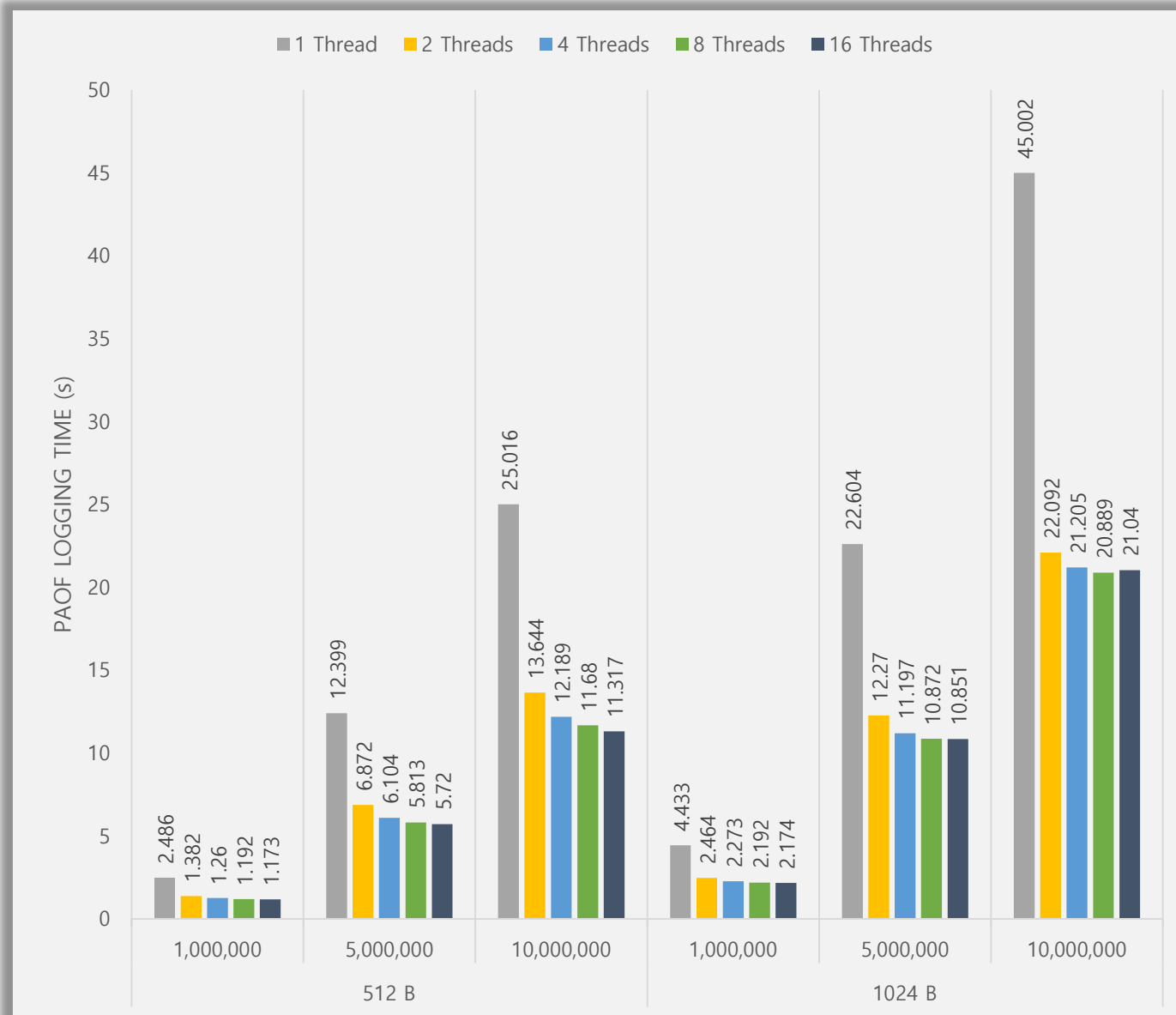
└ Logging



04

Module Experiment

└ Logging









감사합니다

Q/A